KUBICKI, Stefan; NASLAWSKA, Anna

Chronic respiratory insufficiency and gastric and duodenal ulcer.
Pol. arch. med. wewn. 32 no.10:1307-1314 '62.

1. Z Oddziału Chorob Wewnetrznych Centralnego Szpitala Klinicznego MSW w Warszawie Kierownik: prof. dr med. S. Kubicki.
(PEPTIC ULCER) (RESPIRATORY INSUFFICIENCY)

LOZINSKI, Jan; NASLAWSKA, Anna; KUBICKI, Stefan, prof. dr. med.

Lymphosarcoma of the stomach. 2 clinical cases. Pol. arch. med. wewnet. 34 no.12:1689-1692 '64.

1. Z Oddzialu Wewnetrznego Centralnego Szpitala Klinicznego MSW w Warszawie (Kierownik: prof. dr. med. S. Kubicki).

NASLEDKOV, A.M., insh.

Servomechanism for automatic calculation of the moisture in river sand during its dosing with water at concrete plants. Trudy NIIZHB no.33:113-121 '64. (MIRA 18:2)

1. Saratovskiy politekhnicheskiy institut.

BAVLI, Georgiy Samoylovich, prepodavatel'; NASLEDKOV, Ivan Melent'yevich
RUBIN, M., red.; MOLCHANOVA, T., tekhn. red.

[Economizing is a key element of socialist economic management] Bashim ekonomii - metod sotsialisticheskogo khozialstvovaniia. Odesskoe obl. izd-vo, 1958. 37 p. (MIRA 12:2)

1. Direktor zavoda poligraficheskikh mashin "Odespoligrafmash" (for Nasledkov).
(Efficiency, Industrial) (Costs, Industrial)

NASLEDKOV, V.N.

VAKHLYARSKIY, G.A., BOGATYRENVA, V.I., NASLEDKOV, V.N.

Effect of caffeine and bromine on reflex excitation of the respiratory center. Fiziol. zhur. 44 no.5:433-437 My '58 (MIRA 11:6)

1. Kafedra normal'noy fiziologii Meditsinskogo instituta, Kuybyshev.
(BROMIDES, effects,
on resp. responses to irritation of vagus nerve (Rus))
(CAFFEINE, effects,
same)
(RESPIRATION, physiology,
eff. of bromides & caffeine on responses to vagus stimulation (Rus))
(NERVES, VAGUS, physiology,
eff. of stimulation on resp., eff. of bromides & caffeine (Rus))

NASLEDKOV, V.N.

Characteristics of influences from reflexogenic zones of the pleura on the arterial blood pressure. Fiziol. zhur. 47 no.4:459-464 Ap '61. (MIRA 14:6)

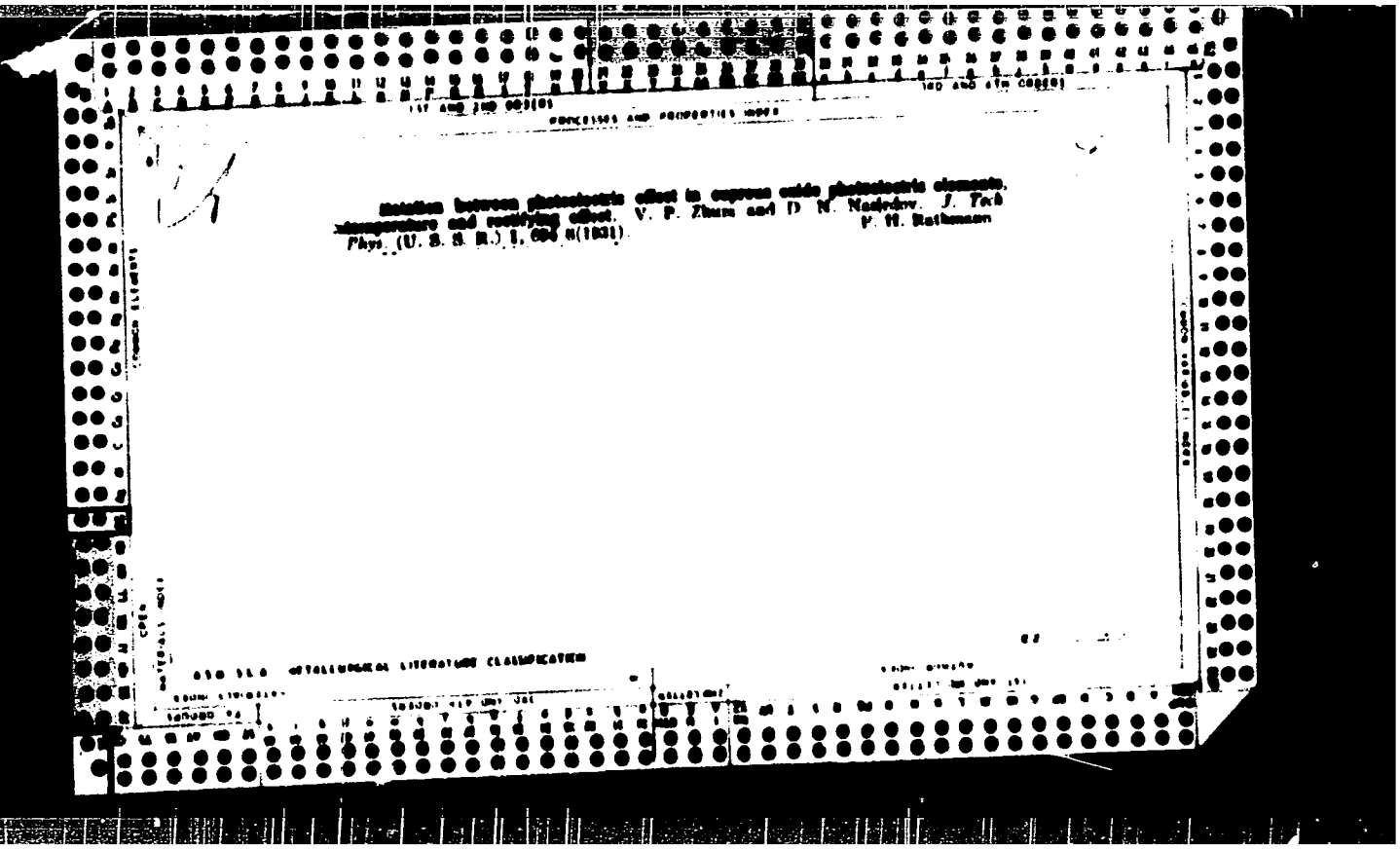
1. From the Normal Physiology Chair, Medical Institute, Kuybshev.
(BLOOD PRESSURE) (PLEURA--INNERVATION)

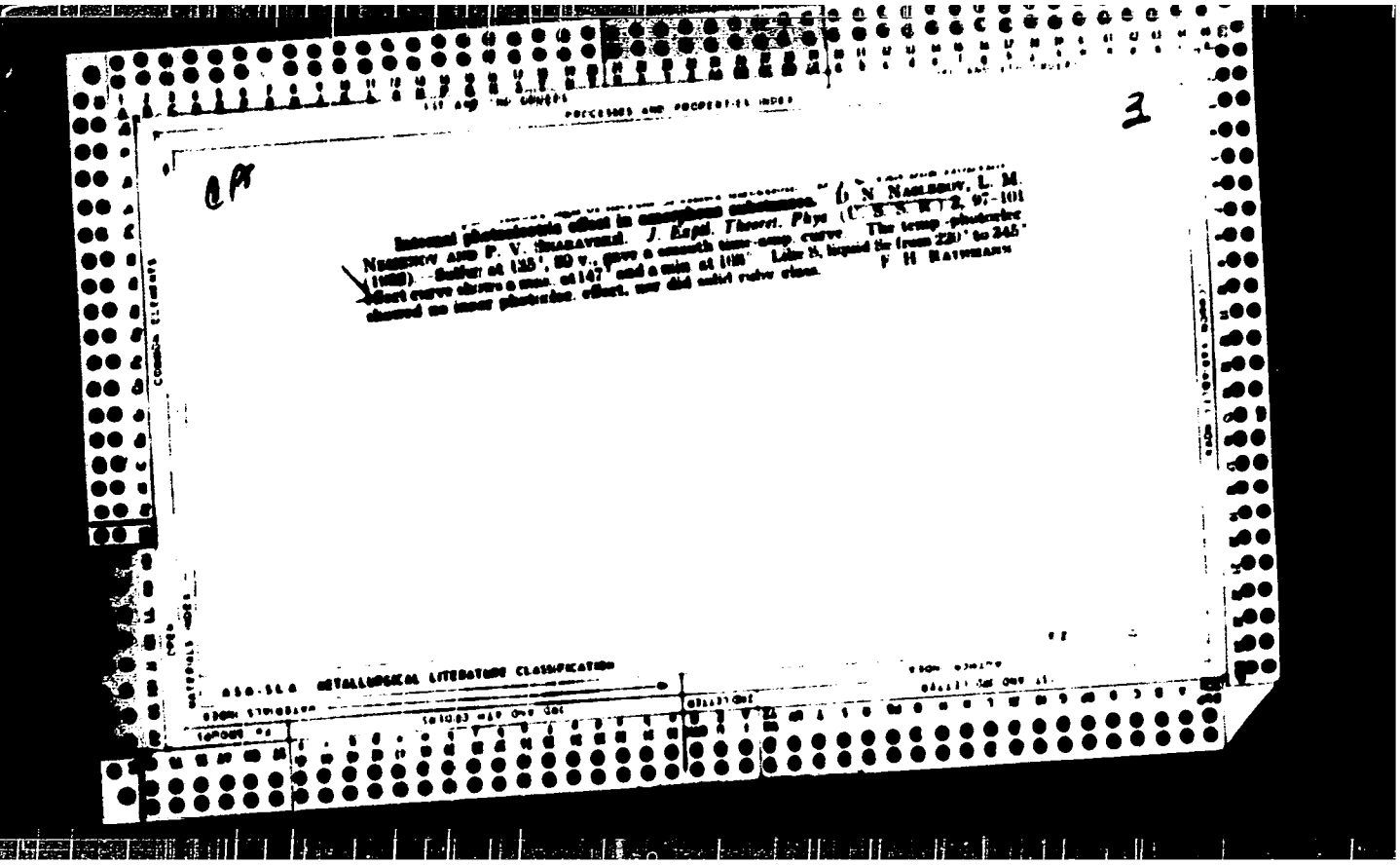
deceased

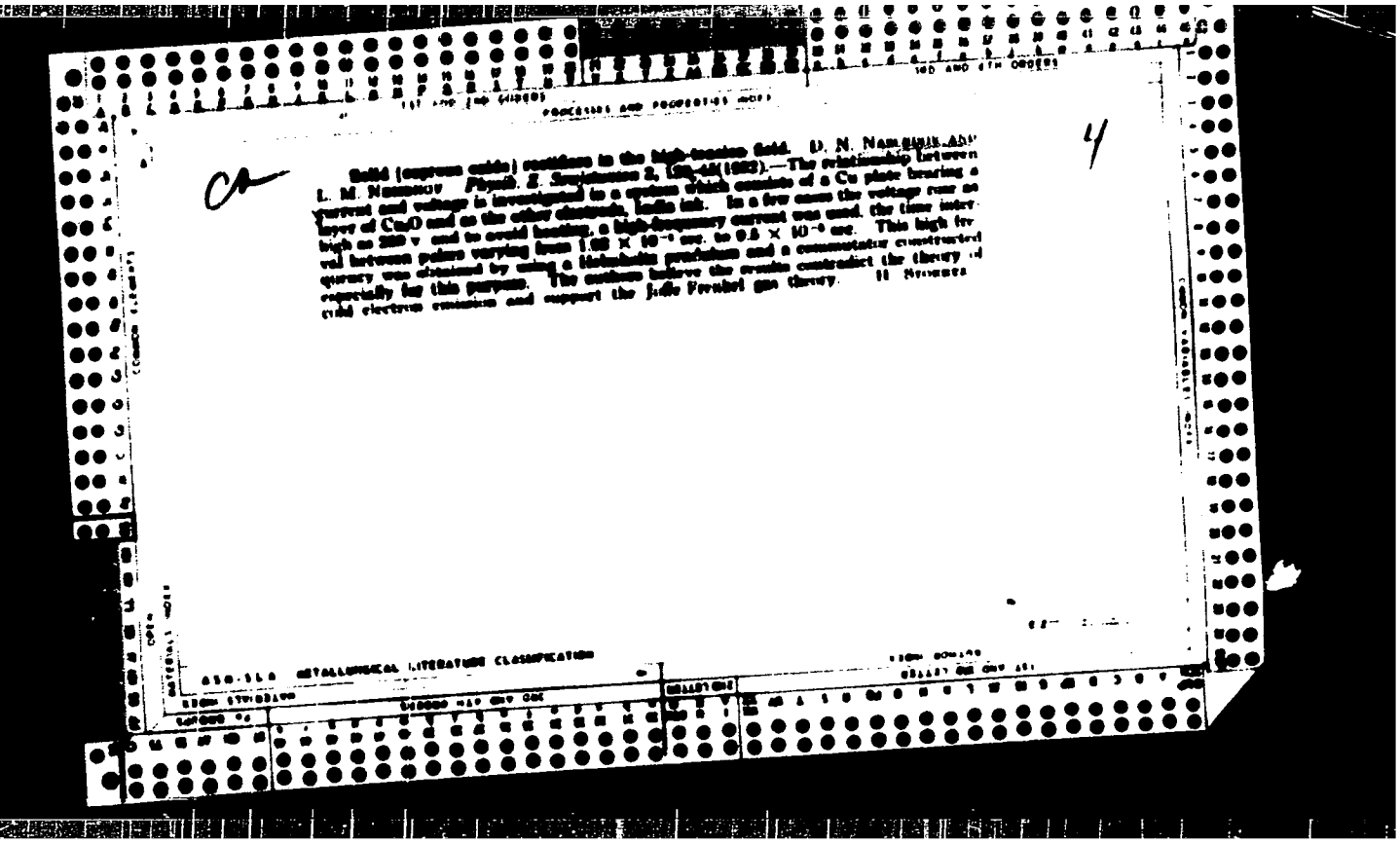
NASLEDOV, Boris Nikolayevich [deceased]; VOL'FSON, F.I., doktor geol.-miner. nauk, red.; KOLOSHINA, T.V., red. izd-va; GUROVA, O.A., tekhn. red.

[Metallogeny of western Tien Shan and Uzbekistan] Metallogeniia Zapadnogo Tian'-Shania i Uzbekistana. Pod red. F.I.Vol'fsona. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po geol. i okhrane nedr, 1961. 328 p. (MIRA 14:6)

(Tien Shan--Ore deposits)
(Uzbekistan--Ore deposits)







Solid (oxygen cable) rectifiers in the high-resistor field. D. N. Nam[illegible] L. M. Nemirov *Physik. Z. Sowjetunion* 2, [illegible] (1932).—The relationship between current and voltage is investigated in a system which consists of a Cu plate bearing a layer of CuO and on the other electrode, India ink. In a few cases the voltage rose as high as 2000 v and to avoid heating, a high-frequency current was used, the time interval between pulses varying from [illegible] to 0.5×10^{-6} sec. This high frequency was obtained by using a [illegible] pendulum and a commutator constructed especially for this purpose. The authors believe the results contradict the theory of cold electron emission and support the Jule Frenkel gas theory. 11 References

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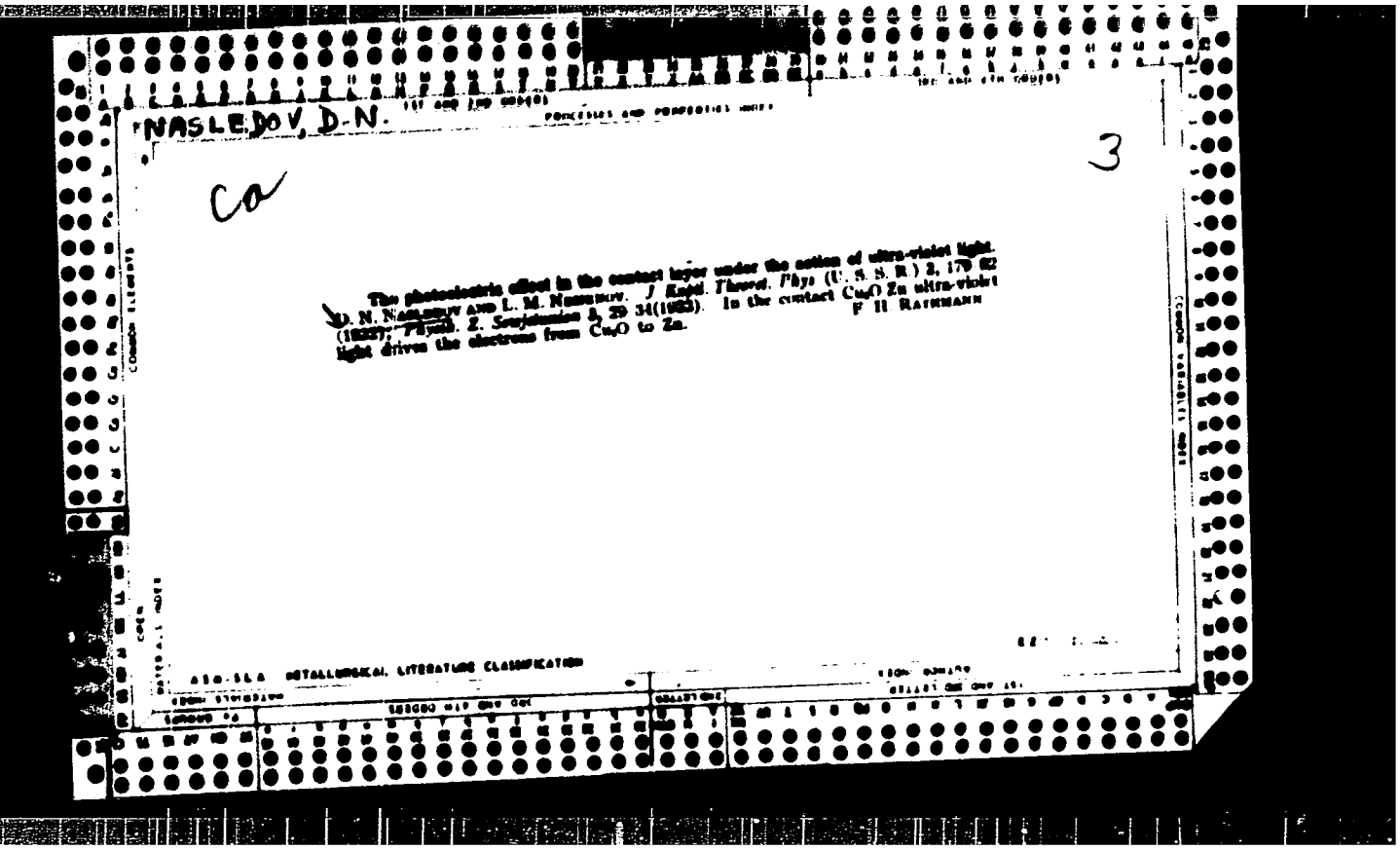
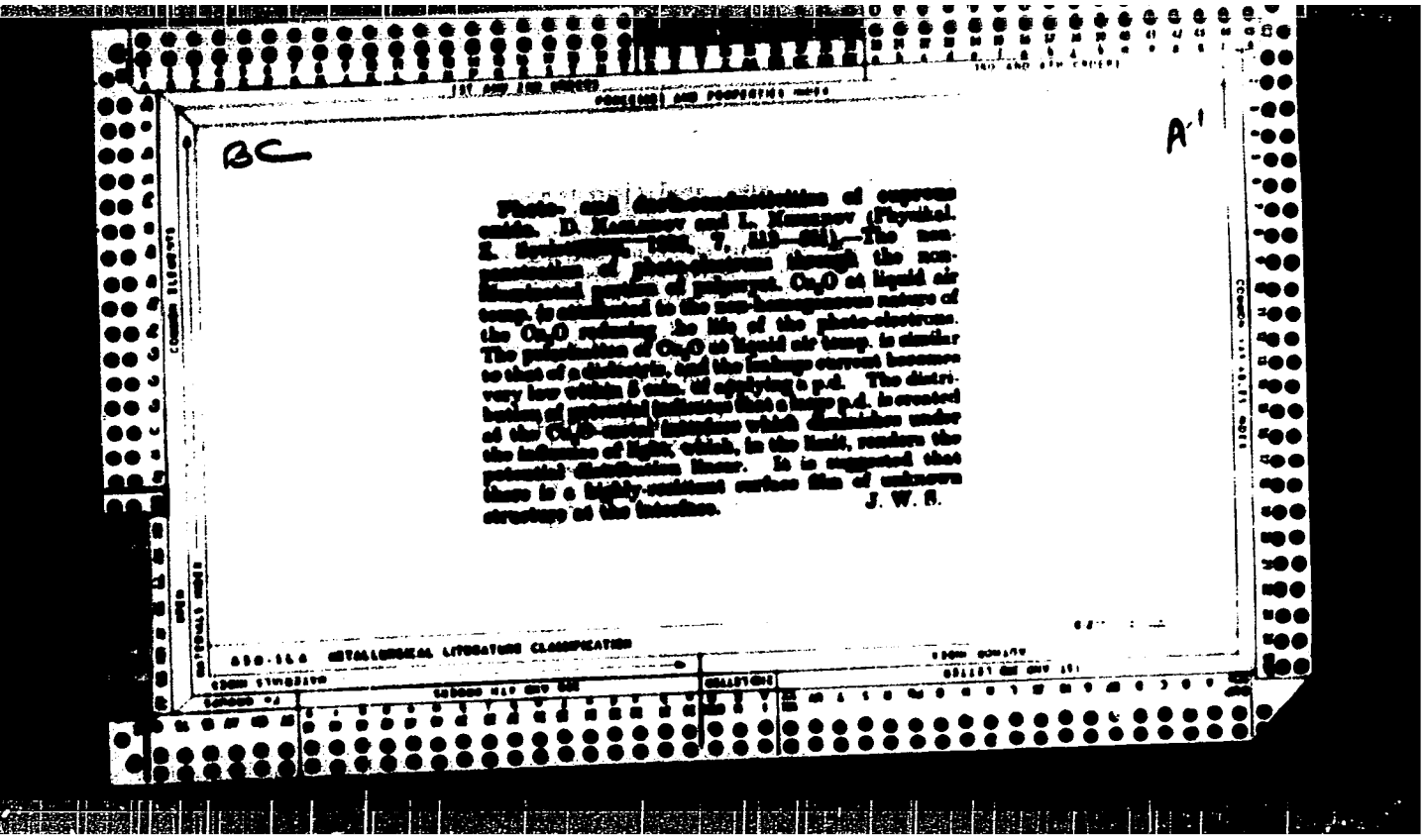




NASLEDOV, D. [N.]

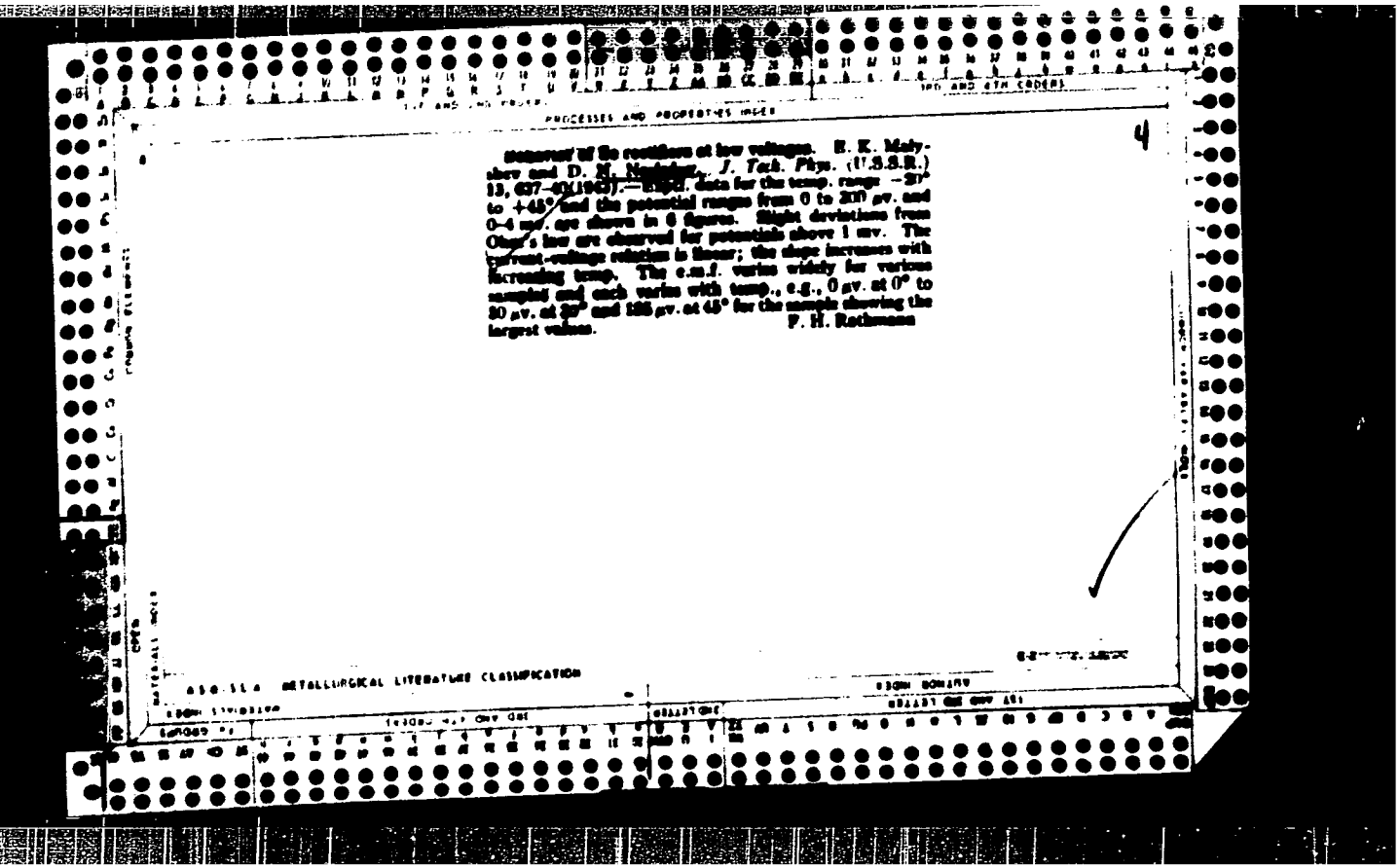
*3305. Effect of Mechanical Deformation on Properties of Copper-Oxide Rectifiers. J. Dunaev and D. Nasledov, Techn. Phys., U.S.S.R. 3. 3. pp. 268-278, 1936. In English.--The authors study the effects of bending on copper-oxide rectifiers and show that after the first bend, with the cuprous oxide on the concave surface, the current in the closed direction is increased. After the second bend, the cuprous oxide is on the convex surface and the current is increased enormously; after the third bend the oxide is concave and the current is increased another two-fold. After a further bend the oxide is convex and the current is decreased, while after the fifth bend the current is increased again. The fundamental cause of the changes in the current in the closed direction is the mechanical damage to the blocking layer. In the case of the current in the reverse direction there is no effect, since the resistance of the copper oxide itself is the determining factor. [See also Abstract 3162 (1933).]

E.T.A.R.

NASLEDOV, Dmitrii Nikolaevich, 1903-

The physics of ionic and electronic processes. Leningrad, Glavnaia red. tekhniko-teoret. lit-ry, 1937. 313 p. (43-30129)

QC173.N3



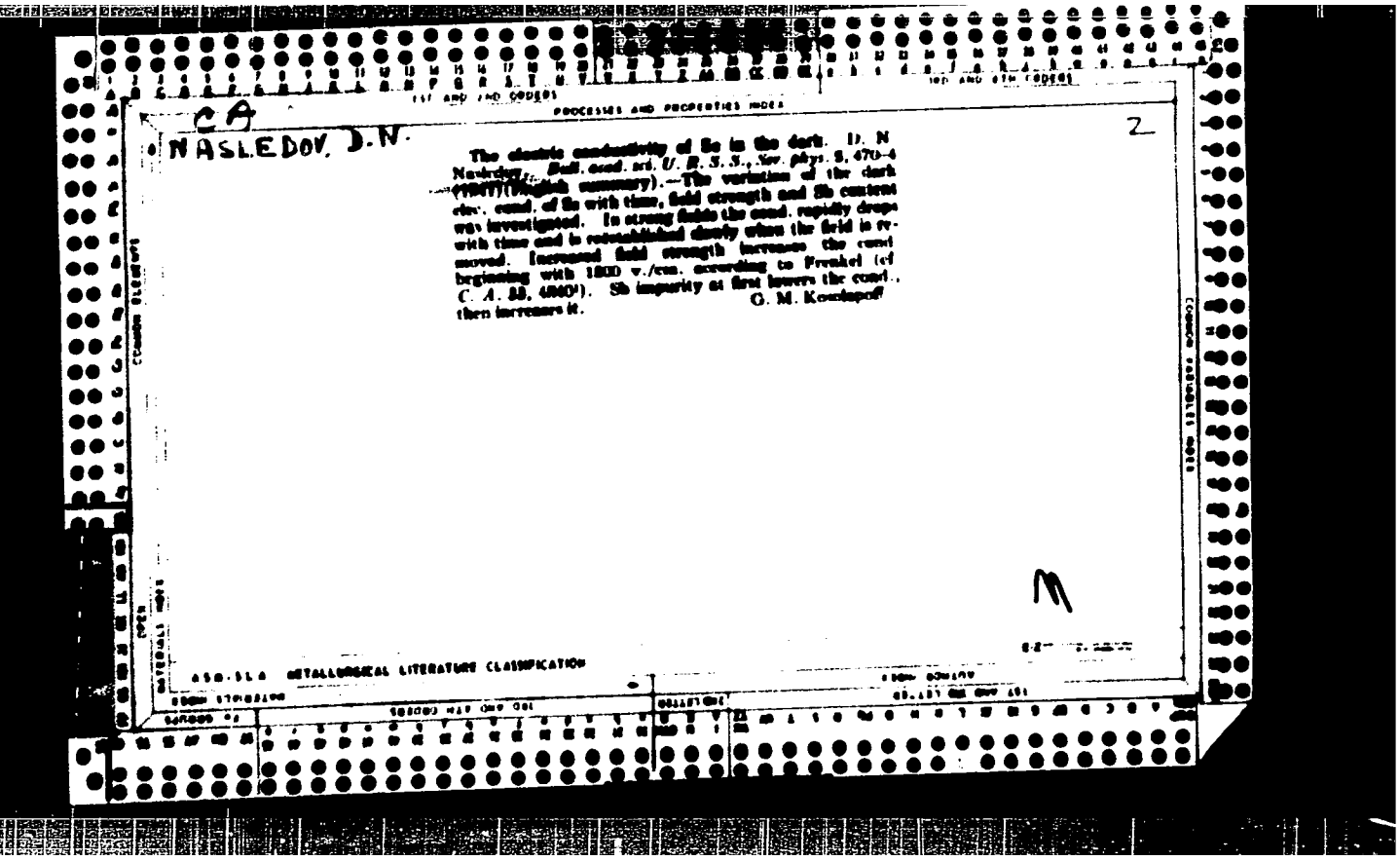
PROCESSES AND PROPERTIES INDEX

4

assessment of the rectifiers at low voltages. E. K. Malyshev and D. M. Nagibin, *J. Tech. Phys.* (U.S.S.R.) 13, 637–40(1943).—Experimental data for the temp. range −37° to +45° and the potential ranges from 0 to 200 μv. and 0–4 mv. are shown in 6 figures. Slight deviations from Ohm's law are observed for potentials above 1 mv. The current-voltage relation is linear; the slope increases with increasing temp. The e.m.f. varies widely for various samples and each varies with temp., e.g., 0 μv. at 0° to 30 μv. at 39° and 185 μv. at 45° for the sample showing the largest values.

P. H. Rathmann

656.11.4 METALLURGICAL LITERATURE CLASSIFICATION



CA

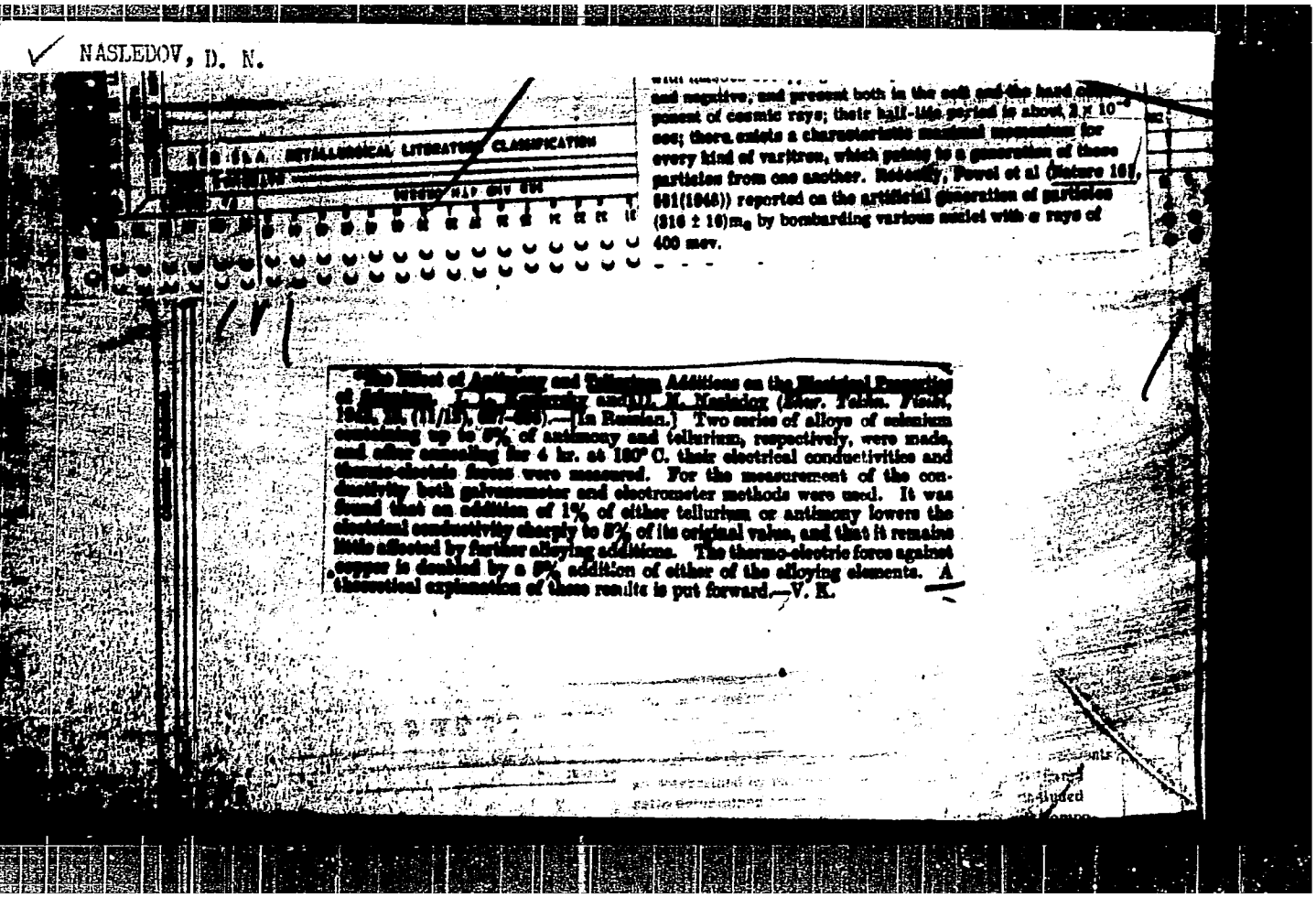
NASLEDOV, D.N.

2

The electric conductivity of Se in the dark. D. N Naslédov. *Bull. acad. sci. U. R. S. S., Ser. phys.* 5, 470–4 (1941)(English summary).—The variations of the dark elec. cond. of Se with time, field strength and Sb content was investigated. In strong fields the cond. rapidly drops with time and is reestablished slowly when the field is removed. Increased field strength increases the cond. beginning with 1800 v./cm. according to Frenkel (cf. *C. A.* 33, 4860⁹). Sb impurity at first lowers the cond., then increases it. G. M. Kondopoff

M

A50-51A METALLURGICAL LITERATURE CLASSIFICATION



NASLEDOV, D. N.

METALLURGICAL LITERATURE CLASSIFICATION

and negative, and present both in the soft and the hard component of cosmic rays; their half-life period is about 2×10^{-6} sec; there exists a characteristic maximal momentum for every kind of varitron, which gives to a generation of these particles from one another. Recently, Powel et al (Nature 161, 961(1948)) reported on the artificial generation of particles $(316 \pm 16)m_e$ by bombarding various nuclei with α rays of 400 mev.

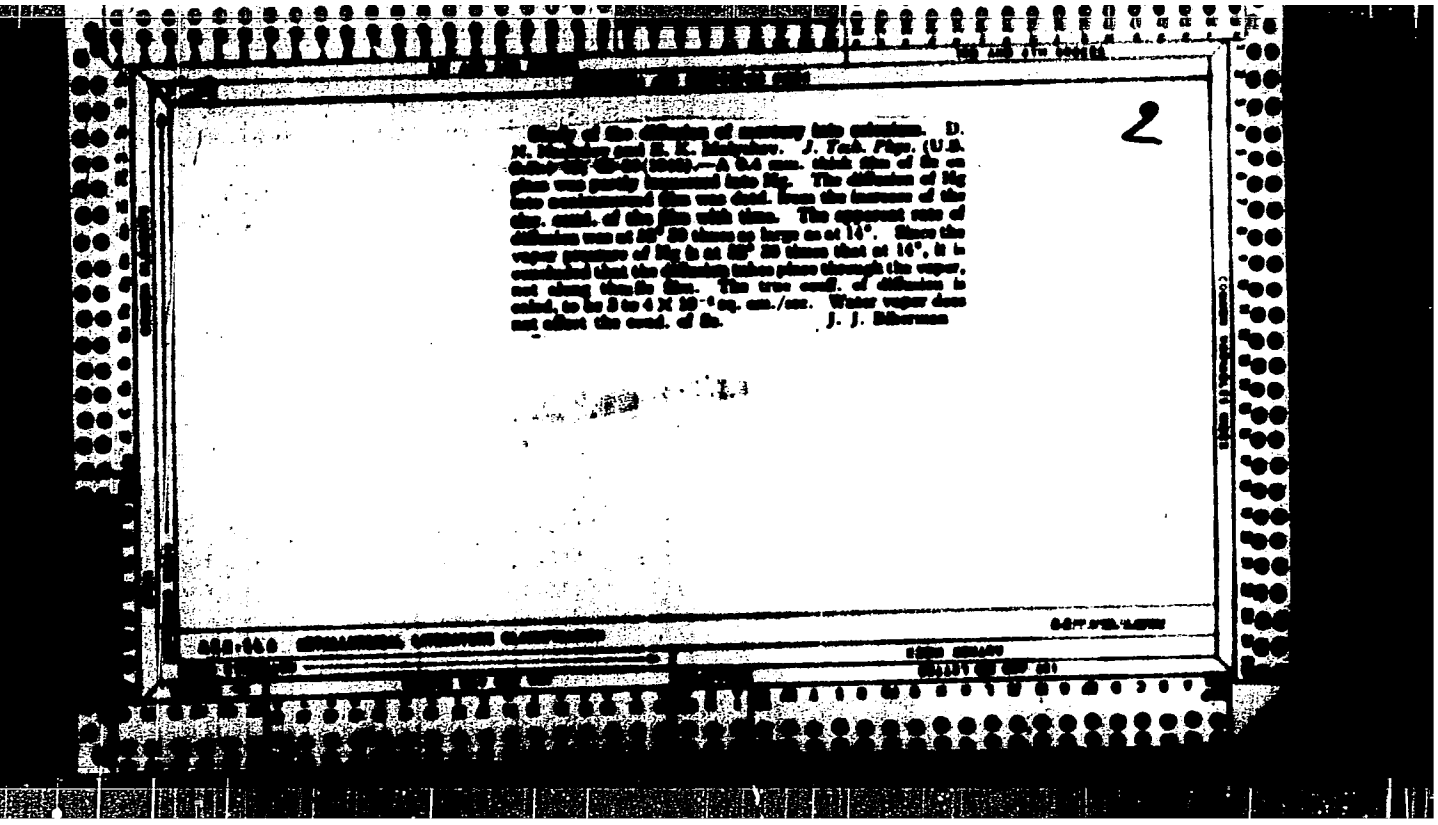
"The Effect of Antimony and Tellurium Additions on the Electrical Properties of Selenium," by D. N. Nasledov (Zhur. Tekhn. Fiziki, 1948, [illegible]), [illegible]).—(In Russian.) Two series of alloys of selenium containing up to 5% of antimony and tellurium, respectively, were made, and after annealing for 4 hr. at 180° C. their electrical conductivities and thermo-electric forces were measured. For the measurement of the conductivity both galvanometer and electrometer methods were used. It was found that an addition of 1% of either tellurium or antimony lowers the electronic conductivity sharply to 5% of its original value, and that it remains little affected by further alloying additions. The thermo-electric force against copper is doubled by a 5% addition of either of the alloying elements. A theoretical explanation of these results is put forward.—V. K.

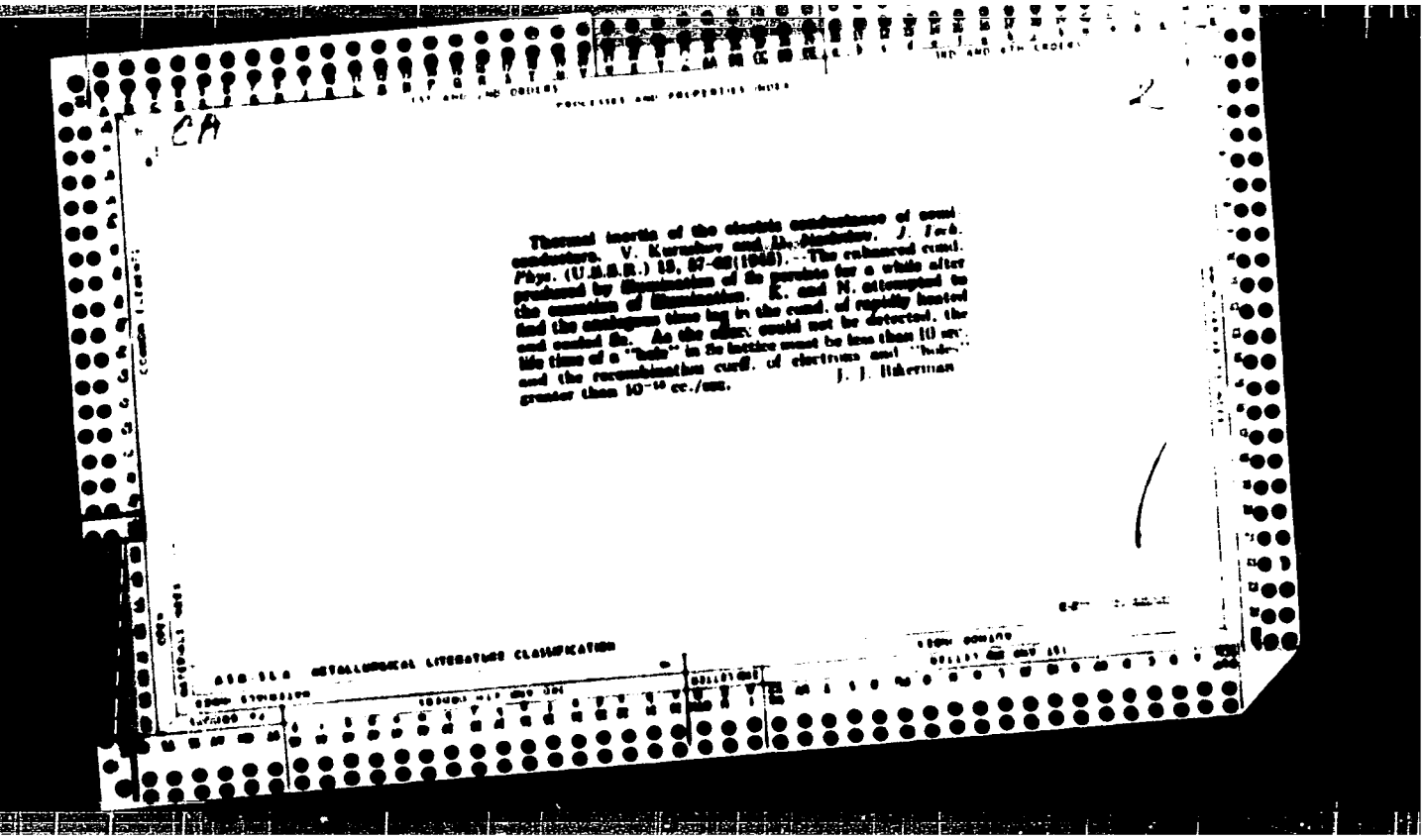
NASLEDOV, D.N.

PROCESSES AND PROPERTIES INDEX

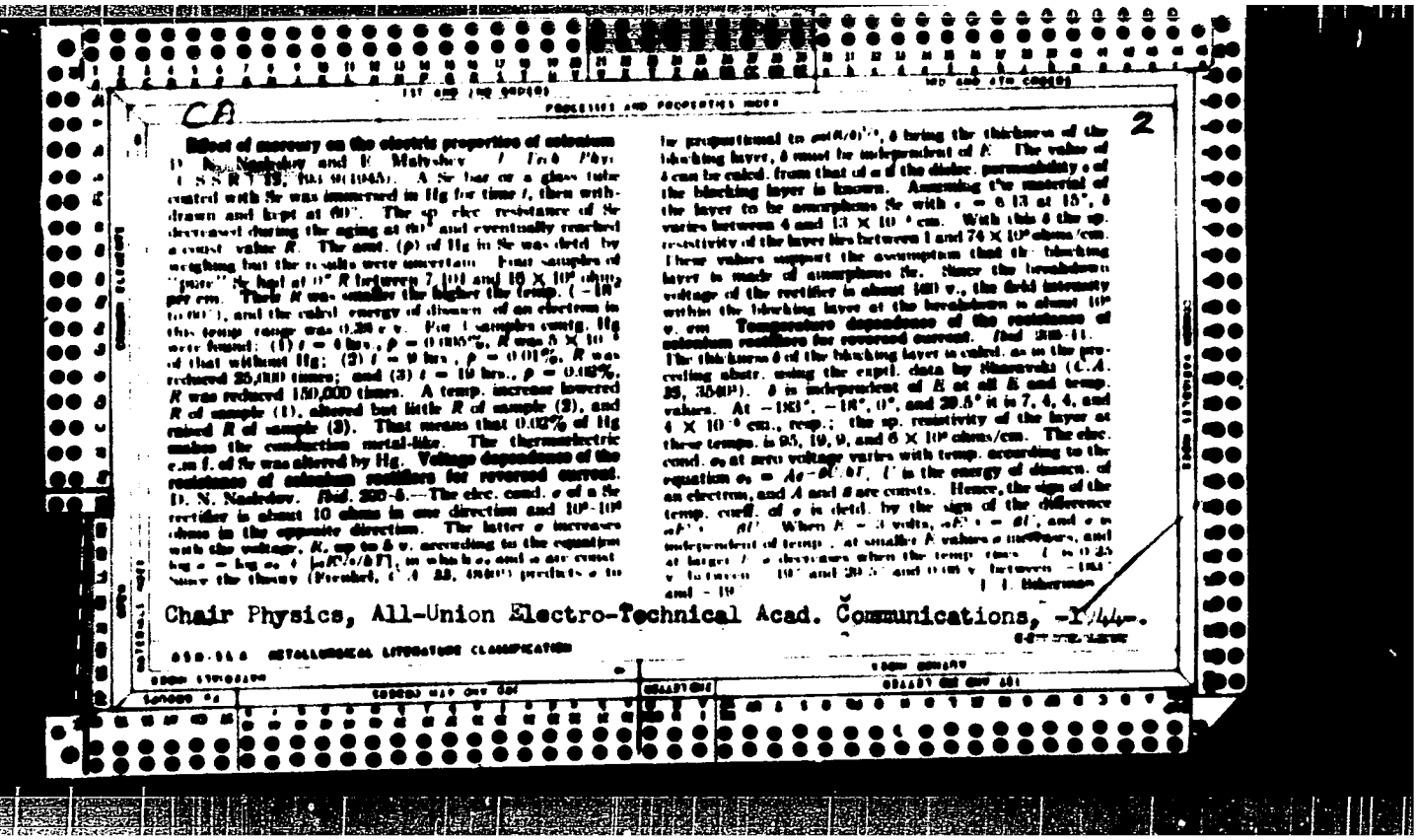
*Photoconductivity of Selenium when Exposed to X-Rays. D. Nasledov and N. Feokhtistov (Zhur. Tekhn. Fiziki, 1943, 13, (11/12), 645-653). [In Russian.] Measurements of the conductivity, under exposure to X-rays, of thin plates of selenium covered with a thin film of gold, were made. It was found that the change of conductivity possesses the same characteristics as the change obtained under exposure to ordinary light. The effects of both X-rays and ordinary light on the conductivity were found to be additive, and of the same order of magnitude. The change of conductivity at the temperature of liquid air was much slower in the case of irradiation by X rays. It is suggested from an estimate of relative quantities of energy involved that a photon of X rays displaces more electrons than a photon of ordinary light, but that further experiments are necessary in connection with this problem. —V. K.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION





Thermal inertia of the electric conductance of semiconductors. V. Kuznetsov and Ya. Shalnikov. *J. Tech. Phys.* (U.S.S.R.) 18, 87-98 (1948). — The enhanced cond. produced by illumination of the germanium for a while after the cessation of illumination. K. and N. attempted to find the analogous time lag in the cond. of rapidly heated and cooled Ge. As the effect could not be detected, the life time of a "hole" in the lattice must be less than 10 sec. and the recombination coeff. of electrons and "holes" greater than 10^{-10} cc./sec. J. J. Hinerman



CA

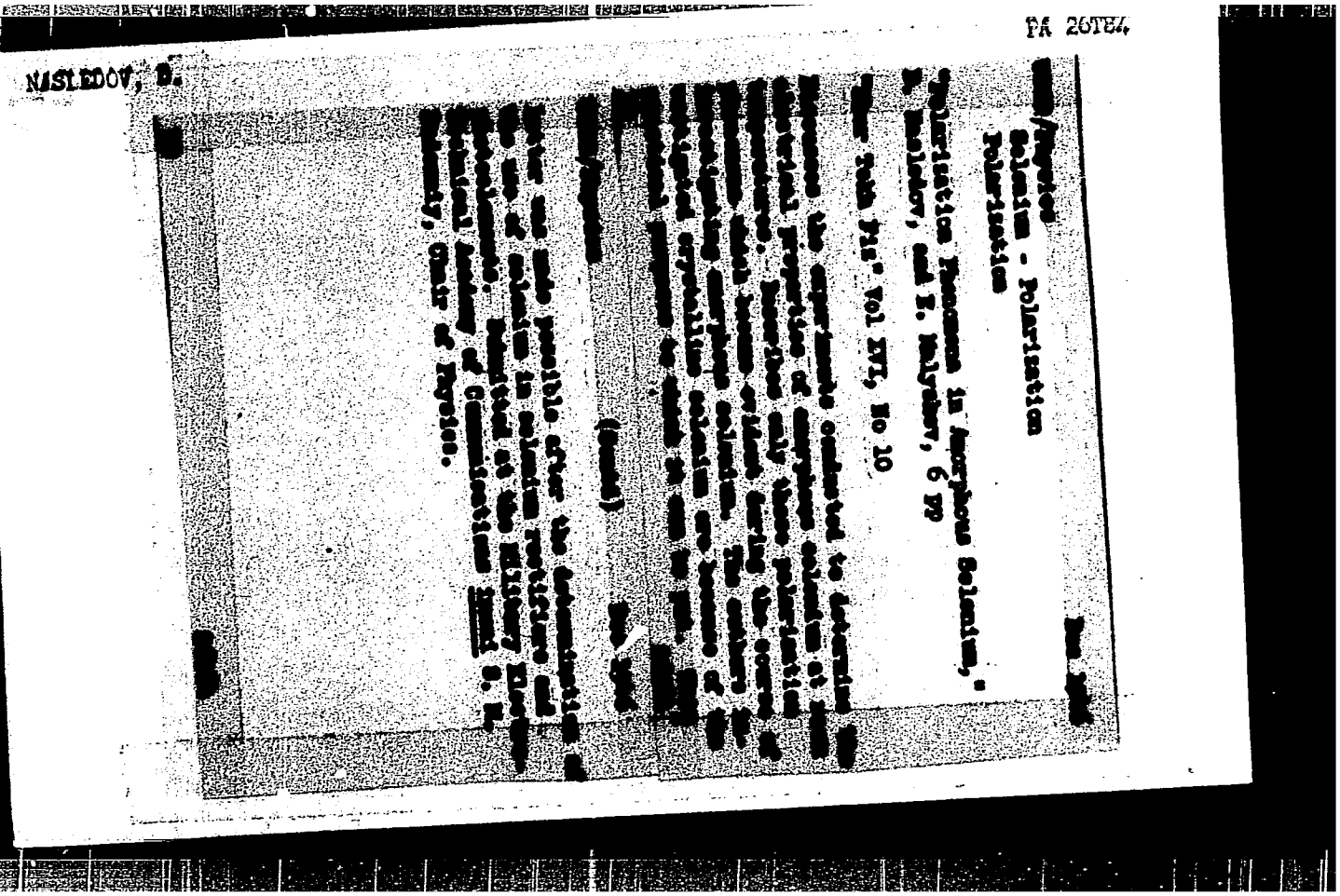
2

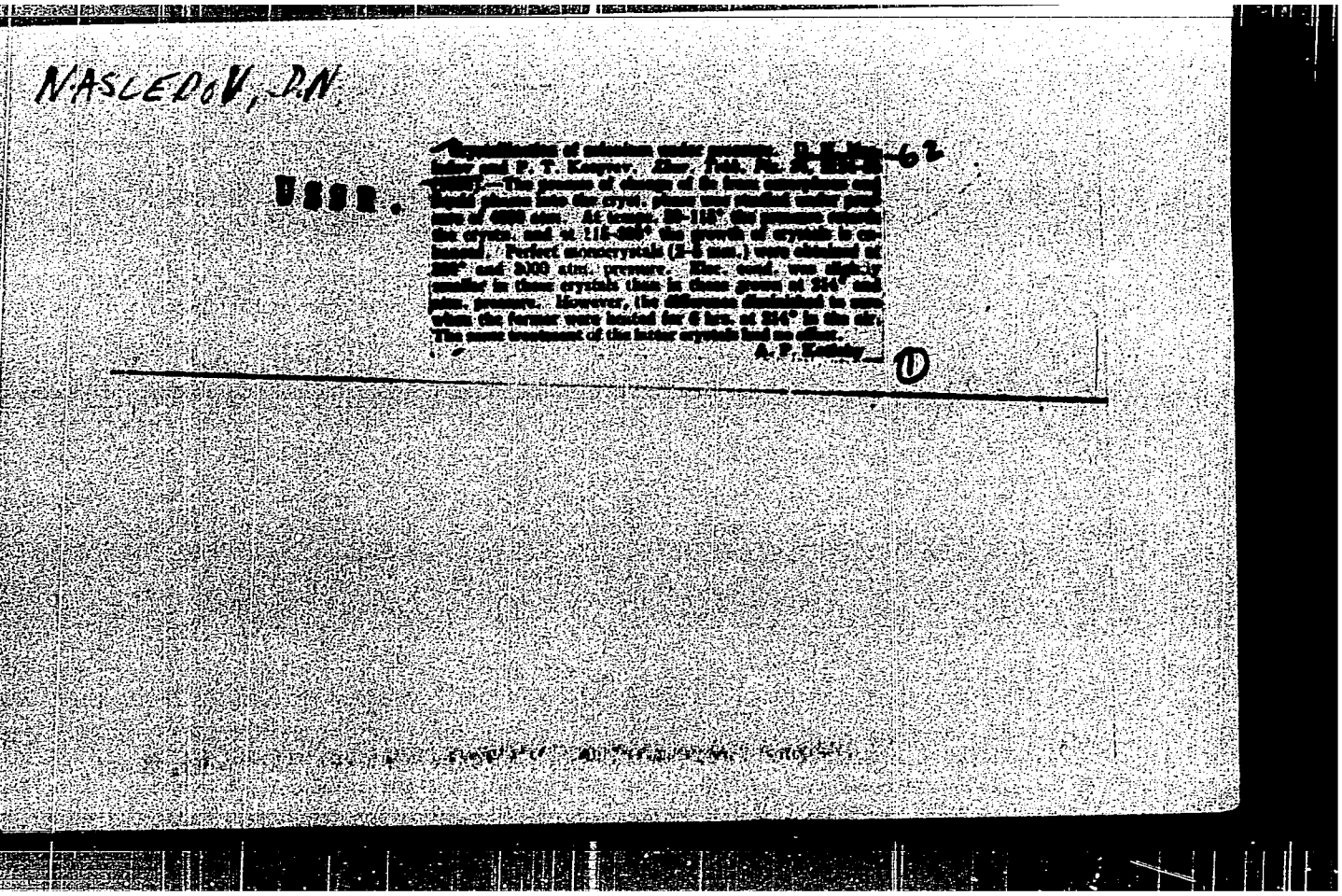
Effect of mercury on the electric properties of selenium

D. N. Nasledov and K. Malyshev. *Zhur. Tekh. Fiziki (J. Tech. Phys. U.S.S.R.)* 15, 743-50 (1945). A Se bar on a glass tube coated with Se was immersed in Hg for time t, then withdrawn and kept at 60°. The sp. elec. resistance of Se decreased during the aging at this temp. and eventually reached a const. value R. The amt. (p) of Hg in Se was detd. by weighing but the results were uncertain. Four samples of "pure" Se had at 0° R between 7.10⁹ and 10 × 10⁹ ohms per cm. Their R was smaller the higher the temp. (~ 10⁶ at 100°), and the calcd. energy of dissocn. of an electron in this temp. range was 0.38 e.v. For 3 samples contg. Hg were found: (1) t = 6 hrs., p = 0.005%, R was 5 × 10⁻⁶ of that without Hg; (2) t = 9 hrs., p = 0.01%, R was reduced 25,000 times; and (3) t = 10 hrs., p = 0.02%, R was reduced 150,000 times. A temp. increase lowered R of sample (1), showed but little R of sample (2), and raised R of sample (3). That means that 0.02% of Hg makes the conduction metal-like. The thermoelectric e.m.f. of Se was altered by Hg. Voltage dependence of the resistance of selenium rectifiers for reversed current. D. N. Nasledov. *Ibid.* 230-6.—The elec. cond. σ of a Se rectifier is about 10 ohms in one direction and 10⁸-10⁹ ohms in the opposite direction. The latter σ increases with the voltage, K, up to 5 v. according to the equation $\log \sigma = \log \sigma_0 + \beta K^2/\delta T$, in which σ_0 and σ are const. since the theory (Frenkel, *C.A.* 33, 4980⁶) predicts σ to be proportional to $\exp K/\delta T$, δ being the thickness of the blocking layer, δ must be independent of K. The value of δ can be calcd. from that of σ_0 if the dielec. permeability ϵ of the blocking layer is known. Assuming the material of the layer to be amorphous Se with ϵ = 6.13 at 15°, δ varies between 4 and 13 × 10⁻⁶ cm. With this δ the sp. resistivity of the layer lies between 1 and 74 × 10⁹ ohms/cm. These values support the assumption that the blocking layer is made of amorphous Se. Since the breakdown voltage of the rectifier is about 100 v., the field intensity within the blocking layer at the breakdown is about 10⁶ v./cm. Temperature dependence of the resistance of selenium rectifiers for reversed current. *Ibid.* 235-41. The thickness δ of the blocking layer is calcd. as in the preceding abstr. using the exptl. data by Shmarovski (*C.A.* 35, 3548⁹). δ is independent of K at all K and temp. values. At −183°, −10°, 0°, and 20.5° it is 7, 4, 4, and 4 × 10⁻⁶ cm., resp.; the sp. resistivity of the layer at these temps. is 95, 19, 9, and 6 × 10⁹ ohms/cm. The elec. cond. σ_0 at zero voltage varies with temp. according to the equation $\sigma_0 = Ae^{-B/T}$, U is the energy of dissocn. of an electron, and A and B are consts. Hence, the sign of the temp. coeff. of σ is detd. by the sign of the difference $dA/T - dB/T$. When K = 3 volts, $dA/T = dB/T$, and σ is independent of temp.; at smaller K values σ increases, and at larger K decreases when the temp. rises. [illegible] between −183° and 20.5° and 0.05 v. between −183° and −10°

I. Bikerman

Chair Physics, All-Union Electro-Technical Acad. Communications, -1944-.





NASAEV, S. V.

FD-2401

USSR/Physics - Selenium layers

Card 1/1 Pub. 153-5/21

Author : Nasledov, D. N.; Dorin, V. A.; and Dikina, I. M.

Title: : Roentgenographic investigation of selenium layers obtained by evaporation in vacuo

Periodical : Zhur. tekh. fiz. 25, 29-38, Jan 1955

Abstract : Selenium layers are widely employed in various semiconductor devices. In the present article the authors discuss x-ray investigations of selenium layers obtained by evaporation in vacuo onto bases made of various materials at various temperatures, and determine the influence of the temperature of the base during evaporation upon the magnitude of the conductivity of the selenium layer. They also studied the influence of heat treatment on the structure of the layer. They clarify the conditions for which axial textures of the selenium layer are formed. They find that selenium during evaporation in vacuo form layers with orientation of the crystals with two kinds of textures ($10\bar{1}2$, room temperature; $11\bar{2}0$, higher temperatures of base). They note that the nature of the base does not influence the character of the texture, but the regime governing the deposition of selenium is decisive. Ten references: e.g. N. T. Mel'nikova, Ye. D. Shchukin, and M. M. Umanskiy, ZhETF 22, 1952.

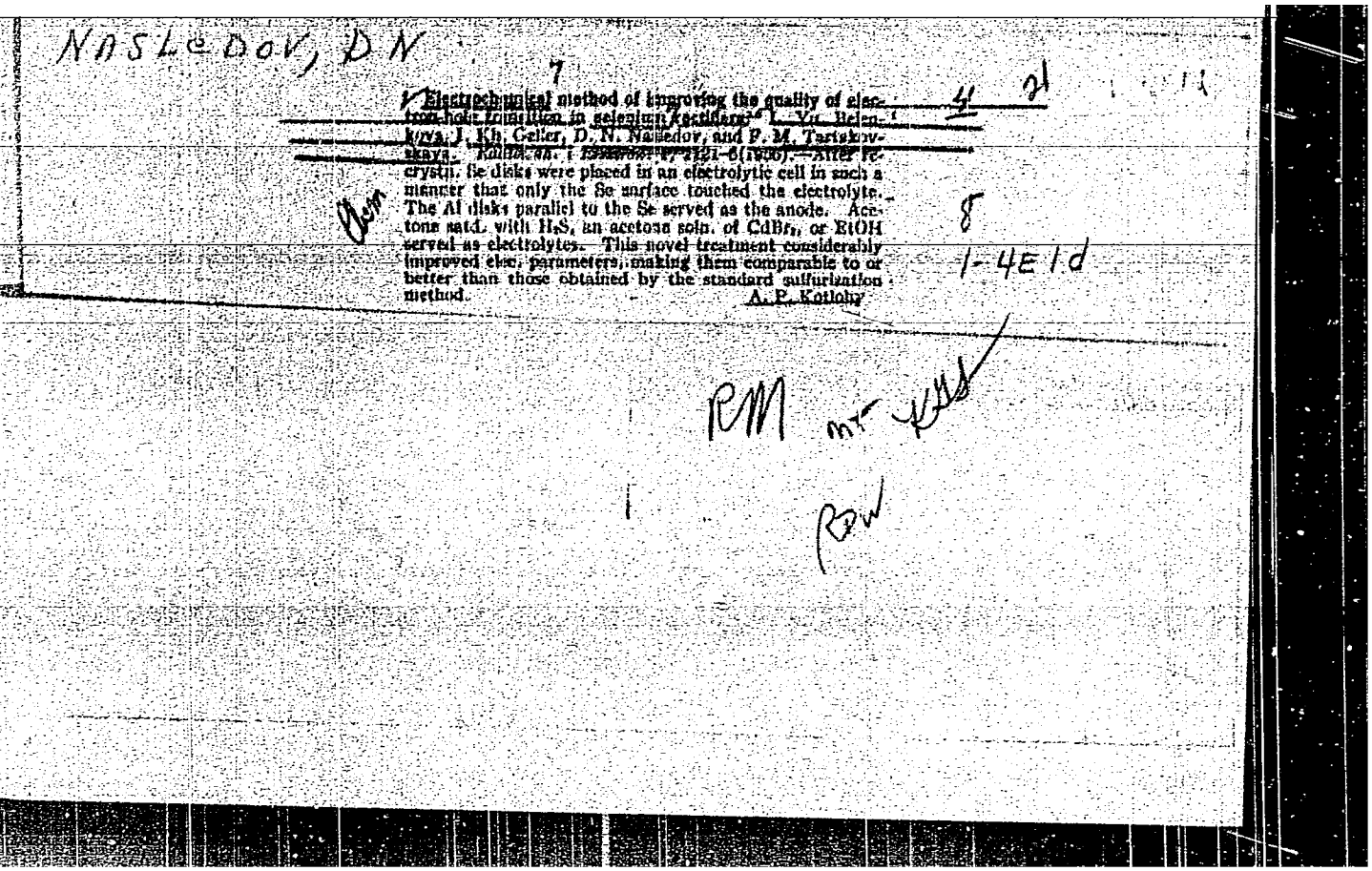
Submitted : June 15, 1954

NASLEDOV, D. N.

"In a report entitled "Semiconductors in Present-Day Technology," Prof D. N. Nasledov discussed in detail the specific characteristics of present-day applications of semiconductor devices. After pointing out that it is necessary to eliminate the lag of USSR work behind foreign semiconductor technology, he particularly stressed the importance of research on high-melting semiconductors, which have been little investigated hitherto.

given at the conference on the Technology of Dielectrics and Semiconductors, Leningrad Electrotech. Inst. im. Ul'yanov (Lenin), June 1956.

Sum 1239



NASL@DOV, DN

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Electrochemical method of improving the quality of elec- 4 21
tron-hole transition in selenium rectifiers." I. Yu. Belen-
kaya, J. Kh. Geller, D. N. Nasledov, and P. M. Tarasov-
skaya. *Radiotekh. i Elektronika*, 1, 2121-6(1956).—After re-
crystn. Se disks were placed in an electrolytic cell in such a
manner that only the Se surface touched the electrolyte.
The Al disks parallel to the Se served as the anode. Ace-
tone satd. with H_2S, an acetone soln. of $CdBr_2$, or EtOH
served as electrolytes. This novel treatment considerably
improved elec. parameters, making them comparable to or
better than those obtained by the standard sulfurization
method.
A. P. Kotloby

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NASLEDOV, D.N.; KHALILOV, A.Yu.

Electric properties of some compounds formed by elements belonging to the third and fifth group of the periodic table. Izv.AN SSSR.S r.fiz. 20 no.12:1494-1495 D '56. (MLRA 10:3)

(Indium antimonide--Electric properties)
(Indium arsenide--Electric properties)

NASLEDOV, D.N., professor.

Colloquy on semiconductors and phosphors. Vest.AN SSSR 26 no.12:92-93 D '56. (MLRA 10:1)
(Garmisch-Partenkirchen, Germany --Semiconductors--Congresses)
(Garmisch-Partenkirchen, Germany--Phospors--Congresses)

MASLEDOV, D. N.

USSR/Electricity - Semiconductors, G-3

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35052

Author: Masledov, D. N., Khalilov, A. Yu.

Institution: None

Title: Electric Properties of InSb

Original Periodical: Zh. tekhn. fiziki, 1956, 26, No 1, 6-14

Abstract: An investigation was made of the monocrystal and polycrystalline specimens of InSb of stoichiometric composition with excess of In or Sb (approximately 0.1%). A study was made of the Hall effect (R), the change of the resistance in the magnetic field ($\Delta\rho/\rho$), and of the electric conductivity (σ).

The temperature was varied from 1.3° to 673° K, H_{max} = 33,000 oersted. The measurements were carried out by means of probes using the usual compensation circuit in darkness and in vacuum of 10^{-4} mm mercury.

Card 1/2

USSR/Electricity - Semiconductors, G-3

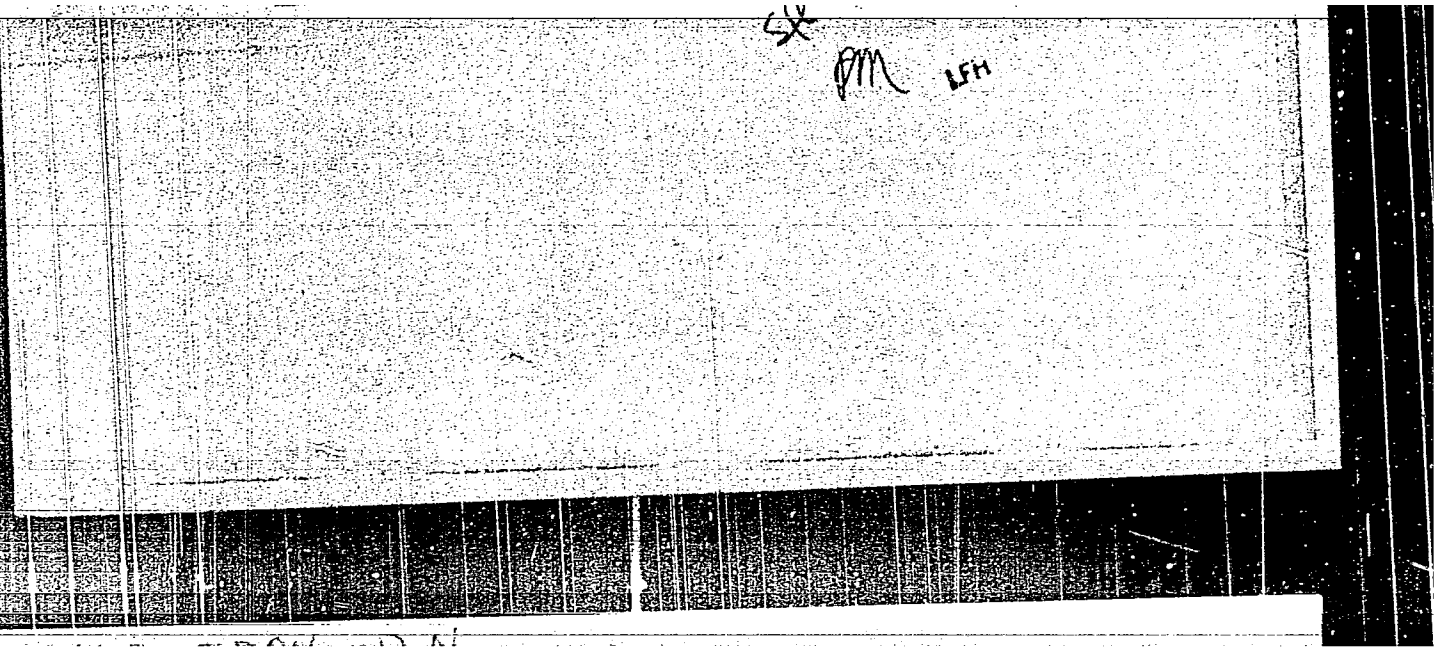
Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35052

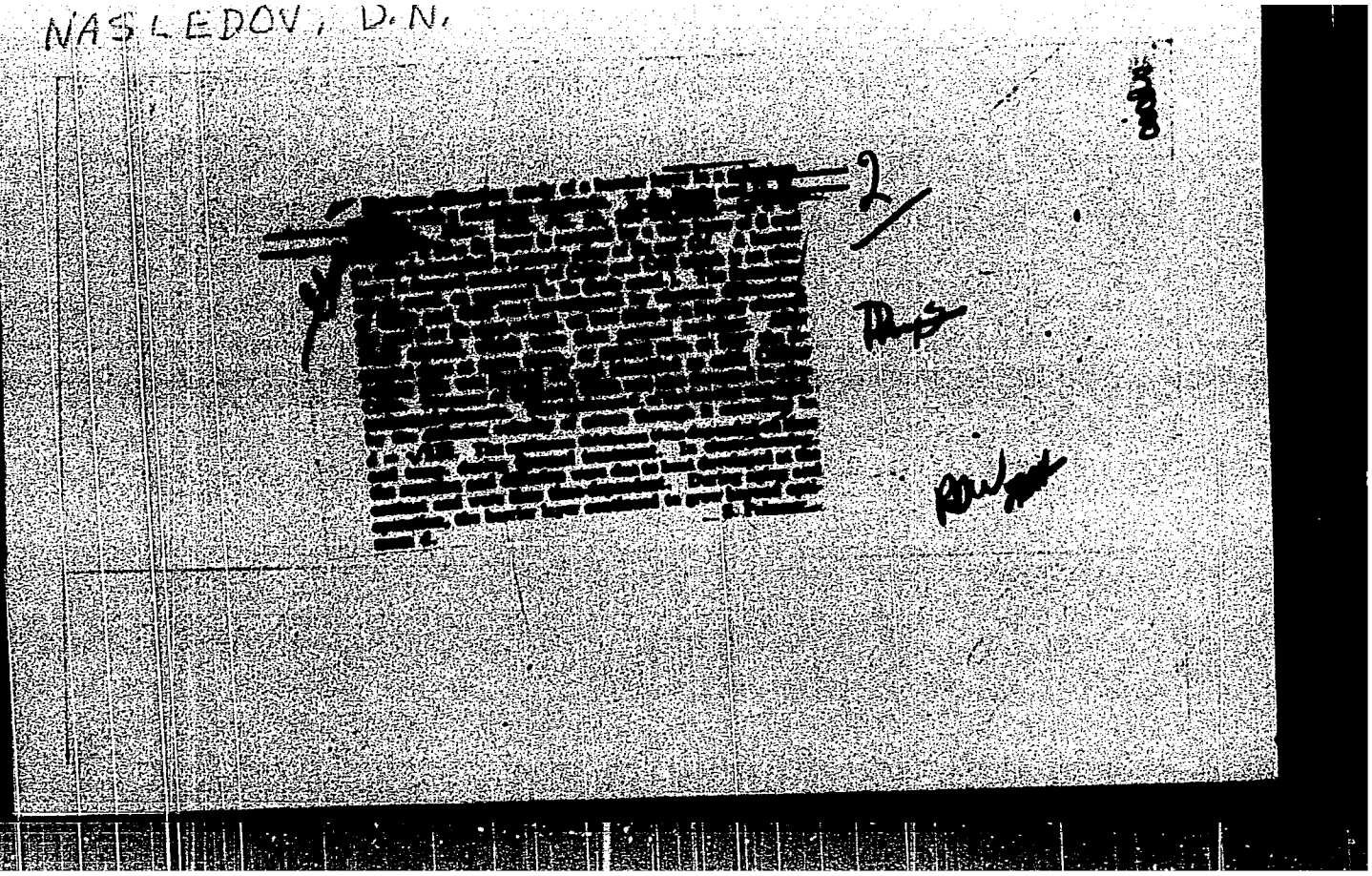
Abstract: It was found that the conductivity activization energy is 0.18 ev. An excess of In or Sb changes σ by not more than 20°. In the vicinity of 300° C $\Delta\rho/\rho$ has a sharply pronounced maximum, the magnitude and form of which depend on the amount of admixture. The Hall voltage is almost proportional to H up to 85° K.

As the temperature is increased, the sign of the Hall voltage reverses, with a higher value of H corresponding to the higher temperatures. The observed variations are in agreement with the Madelung theory (Referat Zhur - Fizika, 1956, 1194).

The electric conductivity was studied with n and p type specimens. The specimens were subjected to zone cleaning, and had a mobility of 25,000 sq cm/v sec at 0° C. The concentration of carriers below 80° C was on the order of 10^{18} cm^{-3}.

Card 2/2





MASLEDOV, D. N.

USSR/Electricity - Semiconductors, G-3

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35059

Author: Grimm, V. R., Masledov, D. N.

Institution: Leningrad Physicotechnical Institute, Academy of Sciences USSR, Leningrad

Title: Investigation of Rectifying Properties of Electron-Hole Junctions: Selenium Sulfides or Tin Selenides

Original Periodical: Zh. tekhn. fiziki, 1956, 26, No 4, 707-715

Abstract: An investigation was made of n-p junctions on the boundary of selenium-sulfide or tin selenide, for the purpose of obtaining rectifiers with small direct voltage drop. Selenium rectifiers of a new type were obtained and their properties were investigated.

Card 1/1

SUBJECT USSR / PHYSICS

AUTHOR KOZYREV, P.T., NASLEDOV, D.N.

TITLE The Dependence of the Electric Conductivity of Polycrystalline Selenium on Pressure of up to 30.000 atm.

PERIODICAL Dokl.Akad.Nauk, 110, fasc.2, 207-208 (1956)
Issued: 11 / 1956

This dependence is here investigated at various temperatures by means of an apparatus for high pressures which is similar to BRIDGMAN'S device. Selenium, which was three times distilled in the vacuum at from 205 to 210° served as initial material. The production of the samples (melting and crystallization) was carried out in the vacuum at 10^{-5} mm Torr. Crystallization temperature amounted to 214°. Micro- and macro-cavities were eliminated by compression of the sample at 10.000 atm and 214° and by following heating of the sample to this temperature during a long period of time. Hereby density was increased by 6 to 7% and electric conductivity by the 1,5 to 2-fold its previous amount. The pressure dependence of the electric conductivity of these samples was investigated within the temperature interval of from 20 to 125°. Results are shown in a diagram. At high pressures electric conductivity depends exponentially on pressure. In the case of one of the samples the specific resistance of selenium at room temperature and atmospheric pressure is $2,6.10^4$ Ohm.cm, but at 30.000 atm it is only 42 Ohm.cm. Approximately the same results were obtained for the other samples.

In the case of all samples it is approximately true for the conductivity σ that $\sigma = A.e^{-E/2kT}$. (T - absolute temperature). The activation energy diminishes with an increase of pressure. In the case of ordinary chemically pure selenium (about 0,006% non-volatile rest) the temperature dependence of σ was high. However, at 30.000 atm the specific resistance at room temperature was 50 ohm, i.e. it is near the value of the specific resistance for the specially purified selenium (42 ohm.cm).

At present similar investigations are being carried out for selenium monocrystals; the first results obtained differ only little from the results described here for polycrystalline selenium. At room temperature the specific resistance of the monocrystal at atmospheric pressure is 2.10^4 ohm.cm, but at 30.000 atm it is 56 ohm.cm. According to a comparison with BRIDGMAN'S results for tellurium, selenium and tellurium behave in a similar way when subjected to high pressures. The authors investigated an admixture semiconductor (selenium) with hole-conductivity. Selenium of this kind probably has an admixture conductivity at low pressures and an independent conductivity at high pressures. This is confirmed by the fact that the electric conductivities of specially purified and of chemically pure selenium are nearly identical.

INSTITUTION: Leningrad Physical-Technical Institute of the Academy of Science in the USSR.

PA - 2181

AUTHOR: DORIN, V.A., NASLEDOV, D.N.

TITLE: On the Problem of the Structure of the Upper Layer of a Selenium Rectifier which is Located near the Electrode (Russian)

PERIODICAL: Zhurnal Tekhn.Fiz. 1957, Vol 27, Nr 1, pp 90-94 (U.S.S.R.)

Received: 2 / 1957 Reviewed: 3 / 1957

ABSTRACT: In the present work the structure of the layers on the boundary of contacts of sulphur and selenium with tin is investigated. This makes it possible to obtain a better knowledge of the structure of the layers near the electrodes of a selenium rectifier. The composition of phases of the intermediate layers of tin-sulphur and tin-selenium contacts was examined by means of the fissionary experiment described by V.A.DORIN and D.N.NASLEDOV, Zhurnal Tekhn.Fiz. 26, 286 (1956). Samples were used for the purpose of investigating the products of reactive diffusion of sulphur with tin, in which the contact of tin and sulphur films was heated to maximum temperatures of 220° C. An attached diagram shows an electronogram recorded from a film produced by means of tin- and sulphur films pressed together by heating to 180°. Similar electronograms were obtained also from films heated to lower temperatures. These electronograms differed from one another only by a lower degree of distinctness of the weak rings. A table shows the measuring- and computation results of the electronograms obtained. In the case investigated here,

Card 1/3

On the Problem of the Structure of the Upper Layer of a Selenium Rectifier which is Located near the Electrode. (Russian)

reactive diffusion leads to the formation of an intermediate layer with two layers. The electronograms obtained on thin films after heating indicate the presence of two chemical alloys (SnS and $SnSe_2$). Further illustrations show the electronograms of Sn, SnS and SnS_2 in comparison with the electronogram of the product of the reaction of tin with sulphur. The color of the films of the reaction product differs considerably from the color of the tin- and sulphur films. Films of the reaction products are cinnamon-colored, while tin-sulphide is yellow and rather transparent in thin layers. The relative quantity of the occurring tin-sulphide and tin-disulphide depends on the temperature of heat treatment. At low temperatures SnS predominates considerably and in the case of an increase of the temperature of the heat treatment the quantity of SnS_2 increases. Further details are discussed.

The structure of the layer of a selenium rectifier near the electrodes. Elements which contain sulphur before being formed are of the greatest practical interest. In the case of contact between selenium and tin-sulphide no considerable rectification may be expected. On the side of sulphur there is probably a

PA - 2181

On the Problem of the Structure of the Upper Layer of a Selenium Rectifier which is Located near the Electrode (Russian).

layer of SnS_2. This tin-sulphide might contribute towards producing a rectifier effect. According to a special examination sulphides and selenides of tin produce a considerable rectifier effect in the case of contact with selenium.

ASSOCIATION: Physical-Technical Institute, Leningrad
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 3/3

HASINDOR, [illegible], professor.

Works in semiconductor physics and technology in the German Democratic Republic. Vest. AN SSSR 27 no.6:73-75 Je '57. (MIRA 10:7)
(Germany, East--Semiconductors)

AUTHORS Vinogradova, K.I., Galavanov, V.V., Nasledov, D.N., 57-9-9/40

TITLE The Preparation of Indium Antimonide of High Purity by the Method of Zone Melting.
(Polucheniye sur'myanistogo indiya vysokoy stepeni chistoty metodom zonnoy plavki - Russian)

PERIODICAL Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 9, pp 1976-1984, (U.S.S.R.)

ABSTRACT The results obtained by the purification of indium antimonide according to the method of zone melting are discussed. Purification was carried out in soldered quarts tubes which were filled with argon. The liquid zone was produced by means of an electric furnace into which a copper cylinder was placed for the purpose of maintaining a uniform temperature in the zone and a great temperature drop at the ends of the zones. The length of the liquid zone was 5 . 5o mm. The displacement velocity of the liquid zone was o,1-1 mm. The ingot diameter was 4-7mm, its length amounted to 15o-35o mm. The distribution of the admixtures according to the length of the ingot was checked by measuring Hall's constant at the temperature of liquid nitrogen. It was found that in the case of the samples under investigation the purest domain was that which was located in the center of the ingot. Samples with an admixture concentration of up to $2,5.1o^{-3}$, a mobility of electrons in them of up to 4oo ooo at $77^{o}K$ and about 1oo ooo $cm^2/V.sec$ at $3oo^{o}K$ were obtained. The output samples had the conductivity of the p-type. After zone melting

Card 1/2

The Preparation of Indium Antimonide of High Purity 57-9-9/40
by the Method of Zone Melting.

individual ingot domains were found to have the conductivity of the n-type. The admixture concentration according to the length of ingots changes in accordance with the exponential law.The distribution coefficient k amounted to 1,3 in some admixtures and to o,8 in others.
There are 7 figures, 2 tables, and 4 Slavic references.

ASSOCIATION Leningrad Physical-Technical Institute AN USSR
(Leningradskiy fiziko-tekhnicheskiy institut AN USSR)

SUBMITTED March, 14, 1957
AVAILABLE Library of Congress

Card 2/2

NASLEDOV, D. N.

AUTHORS: Kuliyev, A. A., [illegible], D. [illegible] 57-2-11/32

TITLE: On the Diffusion of Mercury in Selenium (K voprosu o diffuzii rtuti v selen).

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1957, Vol. 28, Nr 2, pp. 258-261 (USSR).

ABSTRACT: The coefficient for the diffusion of mercury in selenium at various temperatures was immediately determined here according to the method of tagged atoms. The radioactive mercury-isotope Hg^{203} with a half-life of 47 days was used for this purpose. At first selenium-foils (purity of selenium 99,996%) were produced. For this purpose selenium of a certain thickness (8...10 μ) was by means of evaporation in a vacuum applied onto a metal base, then the base was removed by dissolution in hydrochloric acid. The obtained selenium-foils first crystallized at 130°C and then at 200°C during two hours. By means of evaporation the radioactive mercury isotope was then applied onto them. Then the diffusion coefficient of the samples obtained in this manner was determined. The measuring method employed here is one of the variants of the absorption-method suggested by Boyarov and Dukhovich (reference 3) which is based on the absorption of β-radiation. Its nature consists in the fact that with the assignment of the atoms the activity on the side with

Card 1/3

On the Diffusion of Mercury [illegible]

57-2-11/32

mercury diffuses, when ... [illegible] increases. On the basis of the obtained [illegible] was constructed.

The diffusion [illegible] from the gradient of the straight line at the [illegible] on the side of the wall with the height I_0 - that on the other side, t is the time of the diffusion annealing. It is known that $D=D_0 e^{-E/RT}$

is justified. E [illegible] the activation energy = 1,2.10^{3}kcal/Mol, D the diffusion coefficient. The data given here, like the papers by other authors, do not rule out the possibility of determining the approximate value of the diffusion coefficient and the activation energy due to the complication of the diffusion process by the chemical reaction. This is also indicated by the small value of the activation energy. But the order of magnitude, however, apparently is correctly evaluated.
There are 2 fig[illegible], 1 table and 5 references, 4 of which are Slavic.

Card 2/3

On the Diffusion of Mercury in Selenium. 57-2-11/32

ASSOCIATION: Institute of Physics and Mathematics AS Azerbaydzhan SSR (Institut fiziki i matematiki AN Azerbaydzhanskoy SSR. Baku).

SUBMITTED: May 7, 1957.

AVAILABLE: Library of Congress.

1. Mercury-Diffusion

Card 3/3

AUTHORS: Nasledov, D. N., Sokolov, B. V. 57-28-4-4/39

TITLE: The Influence of Iodine Upon the Electric and Photoelectric Properties of Selenium (Vliyaniye yoda na elektricheskiye i fotoelektricheskiye svoystva selena)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 4, pp. 704-714 (USSR)

ABSTRACT: On the basis of the experiments performed here the following was found: 1.) Low iodine-concentrations not exceeding 0.05--0,2% retard the crystallization of selenium, whereas higher ones, greater than 0,2% accelerate it. 2.) The specific resistance and the activation energy of selenium which was subjected to a long-time, crystallization at more than 170-180°C first decrease with a percentual iodine-content, attain a minimum and again increase. In the minimum, at 0,1% iodine, the decrease of the activation energy amounts to 0,1 eV, whereas the conductivity increases 80-300-fold. 3.) In the range from -50 to +100°C the temperature-dependence of the conductivity of mixtures follows van't Hoff's law. At above 100°C a deviation from this law occurs which is sometimes accompanied by a change of sign of the temperature coefficient of con-

Card 1/4

ductivity after a rapid cooling from 170-190°C to room temperature in samples with about 0,05% iodine-content are extremely small. 5.) The modifications of the integral photoconductivity caused by the iodine-admixtures are analogous to the modifications of the dark conduction: the photoconductivity of selenium crystallized at 200°C at first increases with an increase in the iodine-concentration, attains its maximum at 0,2-0,5% and decreases at concentrations of above 1,5%. 6.) With increasing iodine-concentration the photosensitivity at first increases in all domains of the spectrum, attains a maximum at 0,2-0,5% and then decreases. 7.) Due to the predominant influence of iodine upon the photosensitivity in the range of 660-1200 mμ at iodine concentrations exceeding 0,1% in the spectral distribution of selenium crystallizing at 200°C a long-wave maximum of photosensitivity forms. This is displaced with increasing iodine-content, at first toward the long-wave side and then, at concentrations above 0,5%, toward the short-wave side from 80 to 720 mμ. 8.) The nature of the dependence of the photoconductivity on the light-intensity in samples with iodine-admixtures remains the same as in pure selenium: the photo-

current increases proportionally to the square root of the light intensity. 9.) The temperature dependence of the photoconductivity in samples with iodine-admixtures has the same nature as in pure selenium: the steady photoconductivity monotonously increases with the drop in temperature (at first slowly, in the range from +30 to -60°C rapidly, then at temperatures below -60°C it tends toward the limiting value of saturation). 10.) For the explanation of the above-mentioned modifications of the electric and photoelectric properties of selenium a hypothesis on two types of iodine-penetration was set up: at a concentration not exceeding 0,1-0,2% the iodine-atoms penetrate into the interstitial sites of the selenium lattice. At concentrations of above 0,1-0,2% the iodine-admixture forms intercrystalline intermediate layers. The possibility of the penetration of iodine-admixtures into selenium according to two manners is here examined from the point of view of the theory of hydrogen-like defects. 11.) An iodine-admixture leads to an increase in the thermo-electromotive force of selenium and to a decrease in its temperature coefficient. At an iodine-concentration of

The Influence of Iodine Upon the Electric and Photoelectric Properties of Selenium 57-28-4-4/39

7,5% the thermoelectromotive force increases by 0,03-0,08 mV/degree. The causes of the increase in the thermoelectromotive force remain undetermined. There are 8 figures, 2 tables, and 9 references, 7 of which are Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut (Leningrad Physical-Technical Institute)

SUBMITTED: October 1, 1957

Card 4/4

AUTHORS: Nasledov, D. N., Slobodchikov, S. V. 57-28-4-5/39

TITLE: An Investigation of the Electric and Thermoelectric Properties of AlSb. (Issledovaniye elektricheskikh i termoelektricheskikh svoystv AlSb.)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 4, pp. 715-724 (USSR)

ABSTRACT: The electric and thermoelectric properties of AlSb wer investigated here. The latter pertains to that class of semiconductors which form a link between the elements of the 3rd and 5th group. On the basis of the investigations the following could be determined: 1.) The dependence of the electric conductivity and the Hall constant on temperature was examined in the range from 78 to 1200°K and the temperature dependence of the thermoelectric force in the range from 140 to 1250°K. In agreement with other references (1 to 3) the width of the forbidden zone determined from the temperature dependence of the electric conductivity amounted to 1,57 eV. 2.) By the measurement of the thermoelectric force an admixture-level was determined at 0,77 eV. 3.) The mobility of the holes at

Card 1/3

An Investigation of the Electric and Thermoelectric Properties of AlSb. 57-28-4-5/39

room temperature was 150-240 $\frac{cm^2}{V.sek}$. The ratio of the mobility of the holes to that of the electrons seems to be near unity. 4.) In all investigated samples from about 250°K and more the mobility follows the law $u = aT^{-3/2}$. In the entire temperature range the mobility changes according to the law $\frac{1}{u} = aT^{3/2} + bT^{-3/2}$. 5.) According to the measurement data of the thermoelectric force the position of the Fermi-level in a wide temperature range was computed. 6.) The effective mass of the holes was evaluated by means of the formula by Pisarenko. In the range from 400 to 700° K the mean value of it was $(0,9 \pm 0,1)\ m_0$. (m_0 denotes the mass of the free electron). For the values of a and b a table is given. The samples were placed at the authors' disposal by D.A. Petrov and M.S. Mirgalovskaya. There are 10 figures, 1 table, and 6 references, 1 of which is Soviet.

Card 2/3

An Investigation of the Electric and Thermoelectric Properties of AlSb. 57-28-4-5/39

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR Leningrad
(Leningrad Physical-Technical Institute, AS USSR)

SUBMITTED: October 23, 1957

Card 3/3

AUTHORS: Nasledov, D. N., Patrakova, A. Ya., Tsarenkov, B. V. 57-28-4-16/39

TITLE: Etching Media for Gallium Arsenide (Travitel' dlya arsenida galliya)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 4, pp. 779-781 (USSR)

ABSTRACT: The purpose of etching is here formulated in the following manner: A layer deformed during mechanical treatment shall be removed in a manner that the intact monocrystal appears and that the micropollution at the surface of the constructed device is also removed. The experiments showed that the etching reagent with the following composition is useful for this purpose: 50 mL 5% NaOH + 10 ml 30% H_2O_2. This chemical etching reagent is used by the authors in the production of electron-hole transitions in gallium-arsenide. Here polycrystalline samples as well as monocrystals of electron-gallium-arsenide were investigated. On the basis of these experiments the following is stated: 1.) Etching during 5 minutes entirely removes the deformed surface-layer of the monocrystal and does not produce any new formations at its surface. 2.) Etching

Card 1/2

lets distinctly appear the boundaries between the crystals in polycrystalline samples and the etch pattern of the individual crystals. 3.) Etching guarantees the production of reliable alloy-contacts and reduces the leakage current of the electron--hole transitions. The electronograms were obtained by V.A. Dorin. There are 3 figures and 2 references, 1 of which is Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Physical-Technical Institute, AS USSR)

SUBMITTED: December 12, 1957

AUTHORS: Yemel'yanenko, O. V., Nasledov, D. N. 57-28-6-8/34

TITLE: The Electrical Properties of GaAs at Low Temperatures (Elektricheskiye svoystva GaAs pri nizkikh temperaturakh)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 6, pp. 1177-1187 (USSR)

ABSTRACT: Gallium arsenide is a semiconductor compound of the type $A^{III}B^{V}$. The electrical properties of $A^{III}B^{V}$ are similar to those of germanium and silicon and are, in most cases, explained by means of the theory of atomic semiconductors. The characteristic feature of numerous compounds of the type $A^{III}B^{V}$ is the small effective mass of the conduction electrons m_n^+. Thus for InSb $m_n^+ = 0{,}013$ m and for InAs $m_n^+ = 0{,}064$ m (m - mass of free electrons). In the present paper full independence of conductivity and of the Hall constant (Kholl) of temperature in the interval 1,5 — 300°K was obtained for the n-samples of GaAs. Analogous results have formerly been obtained for the n-samples of InSb and

Card 1/3

InAs. Analysis of these data showed that the semiconductors mentioned are in the metal state at the respective concentrations of the donor impurities ($N_d \approx 10^{17} \div 10^{18}$ cm^{-3}). The activation energy of the impurities in their case is equal to zero. The concentration of current carriers is steady. The carrier gas is highly degenerated. An important part is played in connection with the metallization of these materials by the small effective mass of the electrons. **The non-dependence of carrier mobility upon temperature is explained qualitatively by the function of those processes of dispersion the effective cross section of which does not immediately depend upon temperature.** In the analysis of results the term "temperature of semi-ionization of admixtures was introduced. This term is of general validity for semiconductors with high concentrations of admixtures, and with its help it is possible to determine especially the fact of the metallization of the semiconductor ($\Delta E_{pr.} = 0$) after measuring R at not too low temperatures (e. g. temperature of liquid nitrogen). More detailed information

concerning the structure of the energy spectrum in metallized semiconductors and the kinetics of conductivity must be obtained by measurements of the thermoelectromotive force, as well as of R and σ within a larger concentration- and temperature interval. It may also be hoped that this will also explain the nature of the reduction of the resistance of n-samples of GaAs in the magnetic field, which was discovered in the course of this work. The authors thank G. I. Averkiyeva, V. S. Grigor'yeva, T. S. Sukhanova and N. M. Reynov for their cooperation. There are 6 figures, 3 tables, and 14 references, 3 of which are Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut, AN SSSR (Leningrad Physical-Technical Institute, AS USSR)

SUBMITTED: October 1, 1957

Card 3/3

1. Gallium arsenides—Electrical properties 2. Gallium arsenides—Temperature factors 3. Semiconductors—Analysis 4. Semiconductors—Magnetic factors

24(6) PHASE I BOOK EXPLOITATION SOV/3082

Nasledov, Dmitriy Nikolayevich, Professor

Poluprovodniki (Semiconductors) Moscow, Izd-vo "Znaniye," 1959. 44 p. (Series: Vsesoyuznoye obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy. Seriya IV, 1959, no. 30/31) 51,500 copies printed.

Ed.: T.F. Islankina; Tech. Ed.: L. Ye. Atroshchenko.

PURPOSE: The booklet is one of a series of booklets published by "Znaniye" for the general reader.

COVERAGE: The author presents in a popular form the basic phenomena in semiconductors: conductivity of pure semiconductors and impurity semiconductors. He enumerates and describes various semiconductor devices and presents some of their applications in the Soviet economy. No personalities are mentioned. There are no references.

TABLE OF CONTENTS:

Card 1/3

AVAILABLE: Library of Congress

Card 3/3

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S/058/62/000/004/057/160
A058/A101

AUTHORS: Nasledov, D. N., Tsarenkov, B. V.

TITLE: Gallium arsenide phototubes

PERIODICAL: Referativnyy zhurnal, Fizika, no. 4, 1962, 22, abstract 4G184 (V sb. "Fotoelektr. i optich. yavleniya v poluprovodnikakh". Kiev, AN USSR, 1959, 335-338)

TEXT: The authors give the preliminary results of working out a method for producing p-n junctions in gallium arsenide to prepare phototubes on their basis.

[Abstracter's note: Complete translation]

Card 1/1

NASLEDOV, D.N.

24(4) PHASE I BOOK EXPLOITATION SOV/3140

Akademiya nauk Ukrainskoy SSR. Institut fiziki

Fotoelektricheskiye i opticheskiye yavleniya v poluprovodnikakh; trudy pervogo vsesoyuznogo soveshchaniya po fotoelektricheskim i opticheskim yavleniyam v poluprovodnikakh, g. Kiyev, 20-26 noyabrya 1957 g (Photoelectric and Optical Phenomena in Semiconductors; Transactions of the First Conference on Photoelectric and Optical Phenomena in Semiconductors...) Kiyev, 1959. 403 p. 4,000 copies printed.

Additional Sponsoring Agency: Akademiya nauk SSSR. Presidium. Komissiya po poluprovodnikam.

Ed. of Publishing House: I. V. Kisina; Tech. Ed.: A. A. Matveychuk; Resp. Ed.: V. Ye. Lashkarev, Academician, Ukrainian SSR, Academy of Sciences.

PURPOSE: This book is intended for scientists in the field of semiconductor physics, solid state spectroscopy, and semiconductor devices. The collection will be useful to advanced students in universities and institutes of higher technical training specializing in the physics and technical application of semiconductors.

COVERAGE: The collection contains reports and information bulletins (the latter are indicated by asterisks) read at the First All-Union Conference on Optical and Photoelectric Phenomena in Semiconductors. A wide scope of problems in semiconductor physics and technology are considered: photoconductivity, photoelectromotive forces, optical properties, photoelectric cells and photoresistors, the actions of hard and corpuscular radiations, the properties of thin films and complex semiconductor systems, etc. The materials were prepared for publication by E. I. Rashba, O. V. Snitko, K. B. Tolpygo, A. F. Lubchenko, and M. K. Sheynkman. References and discussion follow each article.

Photoelectric and Optical Phenomena (Cont.) SOV/3140

Card 13/16

VINOGRADOVA, K.I.; GALAVANOV, V.V.; NASLEDOV, D.N.; SOLOV'YEVA, L.I.

Production of extremely pure InSb single crystals by means of zone melting. Fiz. tver. tela 1 no.3:403-406 Mr '59.
(MIRA 12:5)

1.Fiziko-tekhnicheskiy institut AN USSR, Leningrad.
(Indium antimonide crystals)

NASLEDOV, D.N.; SMETANNIKOVA, Yu.S.

Photomagnetic effect in p-type indium antimonide single crystals.
Fiz. tver. tela 1 no.4:556-558 '59. (MIRA 12:6)

1.Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Indium antimonide crystals--Magnetic properties)

HASLEDOV, D.N.; FEL'TIN'SH, I.A.

Electric properties of gallium arsenoselenides. Fiz. tver. tela 1 no.4:565-567 '59. (MIRA 12:6)

1.Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Gallium compounds--Electric properties)

LYAN' CHZHI-CHAO [Lien Chih-ch'ao]; NASLEDOV, D.N.

Electric properties of p-type InSb at low temperatures.
Fiz. tver. tela 1 no.4:570-571 '59. (MIRA 12:6)

1.Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Indium antimonide--Electric properties)
(Hall effect)

DORIN, V.A.; KUZNETSOV, B.I.; NASLEDOV, D.N.

Investigating the growth of a layer of an n-type semiconductor at a cadmium-selenium contact. Fiz.tver.tela 1 no.5:734-739 My '59. (MIRA 12:4)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Cadmium) (Selenium) (Semiconductors)

NASLEDOV, D.N.; SLOBODCHIKOV, S.V.

Electric properties of n-type AlSb. Fiz.tver.tela 1 no.5:748-754 My '59. (MIRA 12:4)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Aluminum antimonide—Electric properties)

VOLOKOBINSKAYA, N.I.; GALAVANOV, V.V.; NASLEDOV, D.N.

Electric and galvanomagnetic properties of high-purity InSb. Fiz. tver.tela 1 no.5:755-760 My '59. (MIRA 12:4)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Indium antimonide)

YEMEL'YANENKO, O.V.; NASLEDOV, D.N.

Hornst-Ettingshausen effect in gallium arsenide. Fiz. tver. tela 1 no.6:985-988 Je '59. (MIRA 12:10)

1. Leningradskiy fiziko-tekhnicheskiy institut AN SSSR.
(Gallium arsenide—Electric properties)

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SOV/181-1-8-5/32

AUTHORS: Nasledov, D. N., Yashukova, I. M.

TITLE: Investigation of Selenium Rectifiers in Pulsed Operation

PERIODICAL: Fizika tverdogo tela, 1959, Vol 1, Nr 8, pp 1188-1192 (USSR)

ABSTRACT: The present paper is intended to explain the reason for the conductivity increase of selenium rectifiers in the backward direction (thermal or electric effect) and to investigate the behavior of selenium rectifiers in the case of high backward voltages. In order to remove the effects of joulean heat, the rectifiers for the first time were investigated by means of the pulse method used by V. M. Tuchkevich (Refs 6,7). The current pulse or the voltage pulse, respectively, were measured with EO-53 type or 25-I type oscilloscopes, respectively. The duration of voltage increase at the sample (rectifier) is determined by way of the equivalent resistance of the entire circuit and the capacitance of the rectifier. The measurements were made with commercial selenium rectifiers. The voltampere characteristics of pulsed and of static conditions do not differ as much as expected. In the case of 5 mm thick copper-copper-oxide rectifiers these two characteristics differ considerably.

Investigation of Selenium Rectifiers in Pulsed Operation

Thus in this case heat effects are removed when measurements are carried out at pulsed operation. In selenium rectifiers this effect is compensated by the shape of the sample. The backward resistance of the selenium rectifiers decreases with increasing voltage and from 45 to 50 v resistance variation follows Zener's law. This holds for rectifiers with large and with small area. Together with the measurements of the selenium rectifier voltampere characteristic also their capacitance was measured from the time of voltage increase during the pulse. The backward capacitance of a rectifier decreases with increasing voltage to a certain limit and remains constant afterwards. The voltage at which capacitance stops decreasing agrees with that voltage at which Zener's law begins to apply. If the thickness d of the blocking layer is known then the electric field strength in this layer can be determined. Zener's law begins to apply at electric field strengths of the order 10^5 v/cm. The dell in the inverse rectifier characteristic for pulsed operation shifts a little towards higher voltages. The inverse rectifier resistivity decreases with increasing voltage due to a transition (under the influence of the field of the electrons)

SOV/181-1-8-5/32

Investigation of Selenium Rectifiers in Pulsed Operation

from the filled up zone into the zone of conductivity. The voltage dependence of the inverse resistivity of the rectifier in this case follows Zener's law. This effect in particular seems to cause breakdown of the rectifiers. There are 9 figures and 9 references, 8 of which are Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR
(Leningrad Institute of Physics and Technology of the AS USSR)

SUBMITTED: August 1, 1958

Card 3/3

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SOV/181-1-9-26/31

AUTHORS: Masledov, D. N., Tsarenkov, B. V.

TITLE: The Spectral Characteristics of GaAs Photoelements

PERIODICAL: Fizika tverdogo tela, 1959, Vol 1, Nr 9, pp 1467 - 1470 (US)

ABSTRACT: As the spectra of these photoelements had not been hitherto studied sufficiently nor systematically, the authors of the present paper investigated the dependence of the spectral characteristics of GaAs photoelements on the Cd- and Zn diffusion temperature in the formation of the p-n junction and on the etching. Polycrystalline n-GaAs plates (electron concentration: $\sim 10^{17} cm^{-3}$, mobility ~ 2000 $cm^2/v.sec$) served as initial material. p-n junction was brought about by the diffusion of the acceptor impurities (Cd or Zn) from the gas phase into the pre-evacuated and melted ampul. The diffusion conditions are illustrated in a table. After diffusion, one side of the plate was ground and the depth of the p-region was controlled with a probe. The spectral characteristics were taken with illumination of the p-surface in perpendicular to the p-n junction plane and the darkened electrode. 4

Card 1/2

67402

The Spectral Characteristics of GaAs Photoelements SOV/181-1-9-26/31

Measurements were made before etching and after 15-sec etching at room temperature with 5% NaOH + 30% H_2O_2 (5 : 1).

The results are shown in two diagrams. The curves show the spectral distribution of the short-circuit current referred to one equal amount of incident photons. The wavelength limit $\lambda_{1/2}$ was determined at 0.91 μ, and the width of the forbidden zone was calculated to be $\approx$ 1.35 ev. The following was established: the rise in the diffusion temperature of Cd in the range 760 - 960°C and of Zn in the range 520 - 620°C increases the steep slope of the spectral characteristic in the shortwave range and shifts the maximum into the longwave range; etching decreases the steep slope and shifts the maximum into the shortwave range. Some further details are discussed in this connection. It is finally mentioned that the graduate student S. P. Bardeyeva took part in the investigation. There are 2 figures, 1 table, and 9 references, 3 of which are Soviet.

ASSOCIATION: Leningradskiy Fiziko-tekhnicheskiy institut AN SSSR (Leningrad Institute of Physics and Technology of the AS USSR)

SUBMITTED: April 4, 1959

Card 2/2

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~~24 (6)~~ 24,7600

SOV/181-1-11-8/27

AUTHORS: Zotova, N. V., Nasledov, D. N.

TITLE: Hall Generators From Indium Arsenide for the Measurement of the Magnetic Field Strength

PERIODICAL: Fizika tverdogo tela, 1959, Vol 1, Nr 11, pp 1690-1694 (USSR)

ABSTRACT: From the stoichiometrically composed source materials the indium arsenide is prepared by vacuum melting at 1000°C. The melt was subjected to a zone purification which made possible the examination of the final monocrystalline and polycrystalline samples of the n-type, having an impurity concentration of $1.6 \cdot 10^{16}$ to $10^{10}/cm^3$, as to their most important properties. The temperature dependence of the electrical conductivity is shown in figure 1 for 3 different values of n and a temperature range -196°C - +400°C. The dependence of the Hall constant R on temperature is illustrated in figures 2 and 3. At an impurity concentration of $2 \cdot 10^{17}/cm^3$ R varies by 0.02% per 1°C and at a concentration of $3 \cdot 10^{16}/cm^3$ only by 0.08%. It was established that R does not depend on H up to 21000 Oe. Primary elements were

Card 1/3

Hall Generators From Indium Arsenide for the Measurement of the Magnetic Field Strength

prepared from the samples with the properties described. They consist of platelets (length = 8-5 mm, width 4-3 mm, thickness 0.2-0.1 mm), with 4 or 5 electrodes: 2 current and 2 or 3 Hall electrodes. The platelets are glued on mica and are sometimes placed into small metallic boxes, for better cooling. The contacts are prepared with special care so that only ohmic contacts can occur. The following characteristic properties of the primary elements are measured by the usual method: a) Hall EMF (3 different samples) versus field strength in the temperature range +20 - +55°C (Fig 8), b) Hall EMF versus control current (Fig 9). In a sample of $n = 3 \cdot 10^{17}/cm^3$ the optimum current density is $j = 90 a/cm^2$, in a sample of $n = 2 \cdot 10^{16}/cm^3$, however, it is $60 a/cm^2$. c) the sensitivity of the primary element is measured for 5 different samples (see Table). d) The influence of the shape of the sample on the EMF occurring in the Hall electrode is investigated (Fig 10). e) The accuracy of the H measurements was

Card 2/3

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Hall Generators From Indium Arsenide for the Measurement of the Magnetic Field Strength

SOV/181-1-11-8/27

0.8, 0.6 and 0.5% for 300, 1000, and 3000 Oe, respectively. After a continuous 7-hour operation the values of the primary elements can all be reproduced with an accuracy of 0.5%. There are 10 figures, 1 table, and 9 references.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR, Leningrad
(Physico-technical Institute of the AS USSR, Leningrad)

SUBMITTED: March 4, 1959

Card 3/3

YEMEL'YANENKO, O.V.; ZOTOVA, N.V.; NASLEDOV, D.N.

Thermomagnetic Nernst-Ettingzhausen effect in indium arsenide.
Fiz.tver.tela 1 no.12:1868-1871 D '59. (MIRA 13:5)

1. Fiziko-tekhnicheskiy institut AN SSSR, Leningrad.
(Indium arsenide--Electric properties)

AGAYEV, Ya.; MASLEDOV, D.M.

Studying the electric properties of the system AlSb-InSb.
Izv.An Turk.SSR. no.3:3-9 '59. (MIRA 12:11)

1. Institut fiziki i geofiziki AN Turkmenskoy SSR.
(Antimony compounds—Electric properties)

SOV/109-4-6-17/27

AUTHORS: Komolova, T.I. and Nasledov, D.N.

TITLE: Electrical Characteristics of the Rectifiers Based on TiO_2 (Elektricheskiye svoystva vypryamiteley na osnove TiO_2)

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 6, pp 1033 - 1037 (USSR)

ABSTRACT: The rectifiers were prepared as follows. A plate of metallic titanium having an area of 2 x 2 cm^2 was etched in a water solution of NaF and HCl. It was then washed in petrol and spirit. Next, it was placed into a quartz tube, having a diameter of 35 mm, and then inserted into a cylindrical oven. Here, it was subjected to a heat treatment in an atmosphere of water vapour at a temperature of 700 - 750 °C. The treatment lasted for 2-3 hours. Cooling was effected gradually. The above treatment resulted in the appearance of TiO_2 on the surface of the plate, the thickness of the film being of the order of a few tens of microns. The plates were used to prepare rectifier diodes. The metallic titanium was used as the

Card1/3

lower electrode, while the upper electrode was formed by depositing a layer of silver onto the surface of the plate. The coating could be effected by evaporation or by electrodeposition in an electrolytic bath. The second method was more successful and all the investigated rectifiers were prepared in this manner. The experimental characteristics of the rectifiers are illustrated in Figures 1-6. Figure 1 shows the static current-voltage characteristics of three different rectifiers. Figure 3 shows the current-voltage characteristics of a rectifier taken at various temperatures (ranging from 20 - 300 °C). The capacitances of the rectifiers were measured by employing an audio-frequency bridge and the results are shown in Figure 4; the capacitance is plotted as a function of the biassing voltage applied to the rectifier; it was found that the rectifiers had a capacitance of 0.1 to 0.2 $\mu F/cm^2$. The temperature dependence of the rectifier resistance

Electrical Characteristics of the Rectifiers Based on TiO_2

and capacitance, for various values of the biassing voltage, are illustrated in Figures 5 and 6. From the investigation, it is concluded that the rectifiers have satisfactory electrical characteristics in that they can operate at inverse voltages of up to 10 V and pass comparatively large densities in the forward direction. The rectifiers can operate at temperatures up to 200 °C but it appears that higher operating temperatures are also possible. The capacitance of the rectifiers is comparatively large, this being due to the high permittivity of TiO_2. The authors express their gratitude to A.P. Obukhov for his help. There are 6 figures and 4 English references.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Engineering Physics Institute of the Ac.Sc., USSR)

SUBMITTED: November 22, 1957

NASLEDOV, D. N.

"Electrical Properties of Crystals of Some Compounds of the A^{III} B^{V} Type.

report presented at the International Conference on Semiconductor Physics, Prague, 29 Aug - 2 Sep 60.

S/181/60/002/01/11/035
B008/B011

24.7700

AUTHORS: Magledov, D. N., Pronina, M. P., Radautsan, S. I.

TITLE: Some Optical Properties of Solid Solutions of Indium Arsenoselenides and Indium Arsenotellurides

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 1, pp. 50 - 51

TEXT: The authors found a varying solubility in the systems InAs-In_2Te_3 and InAs-In_2Se_3 (Refs. 1,2), which is explained by structural and energy factors (Ref. 3). When studying the forbidden zone in alloys of the systems considered, they determined ΔE values for different compositions, according to the absorption edge. The methods applied to the synthesis and homogenization of the alloys had been described already earlier (Refs. 1-3). The absorption spectra were recorded with the aid of the infrared spectrophotometer ИКС-14 (IKS-14). Fig. 1 shows the absorption curves of InAs, In_2Se_3, as well as $4InAs.In_2Se_3$, and $2InAs.3In_2Se_3$. The longwave absorption edge shifts

Card 1/2

Some Optical Properties of Solid Solutions of Indium Arsenoselenides and Indium Arsenotellurides

S/181/60/002/01/11/035
B008/B011

regularly from one binary component to the other. This is indicative of the fact that the width of the forbidden zone of the alloys has intermediate values between $\Delta E = 0.3$ ev and $\Delta E = 1.2$ ev. Fig. 2 shows absorption curves for InAs, $InAs.In_2Te_3$, and $InAs.3In_2Te_3$. Also in this case, the absorption edge shifts regularly from InAs to In_2Te_3. Results of optical measurement confirmed the possibility of obtaining substances in which the width of the forbidden zone, compared to the ΔE values of the binary initial components, has intermediate values.

The authors thank N. A. Goryunova for her discussion of results, and B. V. Pavlov for his aid in measurements. There are 2 figures and 6 references: 4 Soviet.

ASSOCIATION: Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad Institute of Physics and Technology, AS USSR). Moldavskiy filial AN SSSR (Moldaviya Branch of the AS USSR)

SUBMITTED: May 11, 1958

Card 2/2

81768

S/181/60/002/02/02/033
B006/B067

24.7700

AUTHORS: Yesel'yanenko, O. V., Lagunova, T. S., Nasledov, D. N.

TITLE: Scattering of Carriers in Gallium Arsenide with Strong Degeneration

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 2, pp. 192-197

TEXT: In the present paper, the authors report on experimental investigations of the electrical conductivity and the Hall effect of highly alloyed n-type and p-type gallium arsenide samples with impurity conductivity, in which the electron and hole gases, respectively, are strongly degenerate. The conduction electrons in gallium arsenide have a small effective mass ($m_n^* \approx 0.05\ m$), so that the electron gas is degenerate in a wide temperature and electron-concentration range. At room temperature, degeneration ($\mu/kT \geq 0$) occurs at electron concentrations $n \geq 5 \cdot 10^{17}$ cm^{-3}, strong degeneration ($\mu/kT > 2$) with $n > 1.5 \cdot 10^{18}$ cm^{-3}; μ denotes the Fermi level energy. The effective hole

Card 1/4

Scattering of Carriers in Gallium Arsenide With Strong Degeneration

S/181/60/002/02/02/033
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mass in gallium arsenide is $m_p^* \approx 0.5$ m, degeneration occurs at room temperature with $p \gtrsim 10^{19}$ cm^{-3}, strong degeneration with $p > 3.10^{19}$ cm^{-3}. n-Type gallium arsenide in the concentration range 4.10^{17} - 3.10^{18} cm^{-3} has been investigated in a previous paper (Ref. 2). In this paper, measurements of conductivity and Hall constant are again carried out in the temperature range 78-500°K (in some cases at 2-900°K) by using the method described in Ref. 2. The carrier concentration and mobility were determined from the equations $n = 1/eR$ and $u = R\sigma$, which are well satisfied in the case of strong degeneration. The purity of the elements added to the samples was ≥ 99.99%, the electron concentration at room temperature was $(1 \div 3).10^{18}$ cm^{-3} and $(3 \div 5).10^{16}$ cm^{-3}; all samples whose characteristics are given in Table 1 were single crystals. Fig. 1 shows the dependence of the carrier mobility on their concentration at 290°K, Fig. 2 the temperature dependence of the resistivity of n-type GaAs in the range 2-900°K, Fig. 3 shows the same for p-type GaAs. Fig. 4 shows $\log u = f(\log T)$ for both types. The investigations yielded the following results: Electron and hole mobility depend only slightly on the con-

Card 2/4

81768

Scattering of Carriers in Gallium Arsenide With Strong Degeneration

S/181/60/002/02/02/033
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centration of the uncompensated impurities in the sample. In the low-temperature range, n-type and p-type conductivity are practically independent of temperature. Above 50-200°K, the carrier mobility decreases with temperature the more, the stronger the sample is alloyed. At T 400-700°K, however, the mobility decrease in non-degenerate samples is stronger than in degenerate ones. At low temperatures, scattering from impurity ions is dominating in all samples, at high temperatures - by lattice vibrations. With increasing carrier concentration, the scattering from the lattice increases. The most important experimental results can be explained by the general theory of carrier scattering in a simple impurity semiconductor. For a qualitative explanation it is sufficient to assume that the velocity of the scattered electrons in strong degeneration is much higher than the mean thermal velocity which they would have in the non-degenerate case, and that it does not depend on temperature. This velocity increases with electron concentration. There are 4 figures, 2 tables, and 7 references: 3 Soviet, 2 American, and 2 British.

Card 3/4

81768

Scattering of Carriers in Gallium Arsenide With Strong Degeneration

S/181/60/002/02/02/033
B006/B067

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR Leningrad
(Physicotechnical Institute of the AS USSR, Leningrad)

SUBMITTED: May 13, 1959

Card 4/4

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81772

S/181/60/002/02/09/033
B006/B067

AUTHORS: Nasledov, D. N., Pronina, M. P., Smetannikova, Yu. S.

TITLE: Spectral Distribution of Photosensitivity in p-Type Indium Antimonide

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 2, pp. 239-241

TEXT: Several publications of various authors dealt with this subject, however, the results did not allow to draw conclusions as to the dependence of photosensitivity of InSb on the acceptor concentration. To investigate this dependence, the authors of the present paper measured the spectral dependence of photoconductivity and of the photomagnetic effect of a number of p-type samples on the acceptor concentration in the range 10^{13} - 10^{15} cm^{-3}. The single crystal samples had a size of 4 · 1 · 0.1 mm^3; after grinding, the surfaces were also treated with an etching agent. The infrared radiation was monochromatized with an ЗМР-2 (ZMR-2) monochromator with NaCl crystal. All measurements were made at the temperatures of liquid nitrogen. The spectral distribution

Card 1/3

Spectral Distribution of Photosensitivity in p-Type Indium Antimonide

S/181/60/002/02/09/033
B006/B067

curves of photoconductivity and of the photomagnetic effect are shown in Fig. 1. It was found that the shape of the curves was independent of the acceptor concentration, and that the absolute sensitivity of pure samples was much higher. The width of the forbidden zone proved to be independent (within the accuracy of measurement) on purity (~ 0.22 ev). The absolute sensitivity in the conductivity maximum for samples with a concentration of 10^{13} cm^{-3} was 4000 v/w, the absolute sensitivity in the maximum of the photomagnetic effect for the same samples was only approximately 40 v/w. The photoconductivity of a number of samples was investigated in the temperature range between 78 and 205°K. Fig. 2 shows the curves recorded for a sample with $3 \cdot 10^{13}$ acceptor atoms/cm^{-3}. The widths of the forbidden zone are given in a table for different temperatures. The following was obtained for the coefficient of the temperature shift: $\Delta E/\Delta T$ = $= -2.4 \cdot 10^{-4}$ ev/deg, which is in good agreement with other data from publications. As may be seen from Fig. 2, the maximum of spectral sensitivity becomes wider with increasing temperature, and at the temperature of dry ice a second maximum is observed on the edge of the

Card 2/3

8 1772

Spectral Distribution of Photosensitivity in p-Type Indium Antimonide

S/181/60/002/02/09/033
B006/B067

curve. The curves coincide in the short-wave part. There are 2 figures, 1 table, and 7 non-Soviet references.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR Leningrad (Physico-technical Institute of the AS USSR, Leningrad)

SUBMITTED: June 5, 1959

Card 3/3

... NASLEDOV, D. N.

81884

S/181/60/002/05/02/041
B008/B058

24.7700

AUTHORS: Lyan' Chzhi-chao, Nasledov, D. N.

TITLE: Influence of an Electric Field on the Electrical Conductivity, the Hall Constant, and the Magnetic Resistance of n-Type InSb at Low Temperatures

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 5, pp. 793-798

TEXT: The authors investigate the electrical conductivity, the Hall constant, and the change of the resistance in the magnetic field as dependent on the electric field strength at low temperatures. Their data can be explained by the fact that the electrons of the impurity band pass over into the conduction band under the effect of the electric field. The authors assume that the electrons pass through "tunnels" from the impurity band to the conduction band under the action of the field, since the mass m_{eff} of the electrons and also the activation energy of the n-type InSb donors are very small. The impurity concentration ranged from 10^{12} to $10^{14}/cm^3$ in the measurements. The dependence of the electrical conductivity σ and the Hall constant R on the strength of the electric field is investigated first.

Card 1/3

81884
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B008/B058

Influence of an Electric Field on the Electrical Conductivity, the Hall Constant, and the Magnetic Resistance of n-Type InSb at Low Temperatures

The size of the samples is about 8 × 1.5 × 1.0 mm^3. The dependence of σ and R on the direction of the electric field at 78°K is shown in Figs. 1 and 2. It appears that at this temperature Ohm's law is valid throughout the E-range in which measurements were made; usually, it is only valid for very weak fields. The critical E-values are found, however, already in the range 0.05 - 0.3 v/cm. σ increases by a full order of magnitude for stronger electric fields, and with a further increase of the field strength σ tends toward saturation. Two mechanisms can really cause the effect of the electric field: impact ionisation or the transition through the "tunnel effect". The deviation from Ohm's law in germanium at the temperatures of liquid helium is explained by impact ionisation. The deviation in InSb at the temperatures of liquid helium is ascribed by the authors to the fact that the "tunnel transition" plays an important role in the mechanism of the effect of the electric field on n-type InSb. Since the m_{eff} of the electron and the activation energy of the InSb donors are considerably lower than in germanium, the deviation from Ohm's law begins with very weak

Card 2/3

81884

Influence of an Electric Field on the Electrical Conductivity, the Hall Constant, and the Magnetic Resistance of n-Type InSb at Low Temperatures

S/181/60/002/05/02/041
B008/B058

fields. From their results the authors conclude that the electric field activates the electrons similar to the temperature. The field dependence of the resistance in the magnetic field in the presence of a weak electric field still remains unclarified for the time being. There are 5 figures, 1 table, and 3 references: 1 Soviet and 5 English.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR, Leningrad
(Institute of Physics and Technology AS USSR Leningrad)

SUBMITTED: September 14, 1959

Card 3/3

NASLEDOV, D. N.

81887
S/181/60/002/05/06/041
B008/B058

24.7700

AUTHORS: Nasledov, D. N., Poltin'sh, I. A.

TITLE: Electrical Conductivity of Gallium Arsenide Selenides at High Temperatures

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 5, pp. 823-825

TEXT: In a preliminary study (Ref. 1) the authors investigated the temperature dependence of the electrical conductivity of gallium arsenide selenides of different compositions in the temperature range 90-570°K. The results of an investigation of the temperature dependence of the electrical conductivity up to 1,000°K, as well as of some properties of gallium selenide are given in the paper under review. Fig. 1 shows the function $\log \sigma = f(1/T)$ in the six samples of the system $GaAs-Ga_2Se_3$; the compositions of the samples are tabulated. Unlike the preliminary study, all measurements were made in an argon atmosphere. The width of the forbidden zones was determined for all samples from the temperature dependence of the Hall constant R in the range 750-1,000°K. The authors found no data on the electric properties of gallium selenide in publications, and therefore they mention some

Card 1/2

Electrical Conductivity of Gallium Arsenide Selenides at High Temperatures

S/181/60/002/05/06/041
B008/B058

results of an investigation of this material. The temperature dependence of the thermo-emf and the Hall effect show that p-type conductivity is predominant in gallium selenide. Fig. 2 shows the temperature dependence of the mobility u and concentration n of the carriers in the temperature range in which the authors measured R. It appeared that u increased up to 750°K with the temperature, passed through a maximum, and then decreased according to the law $u \sim T^{-3/2}$. n remained practically constant up to 750°K and then it increased quickly. $\log \sigma = f(1/T)$ shows no break at 750°K (Fig. 1). The existence of an acceptor level in Ga_2Se_3 may be concluded from the function R(T) in the range 650-750°K.
There are 2 figures, 1 table, and 4 references: 3 Soviet and 1 German.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR, Leningrad
(Institute of Physics and Technology AS USSR Leningrad)

SUBMITTED: September 23, 1959

Card 2/2

Masledov, D. N.

81888
S/181/60/002/05/07/041
B008/B058

24.7700

AUTHORS: Agayev, Ya., Masledov, D. N.

TITLE: Some Electric Properties of the AlSb-InSb System

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 5, pp. 826-829

TEXT: The investigation of some electric properties of solid solutions of the AlSb-InSb system was the aim of the paper under review, the Hall effect, the electrical conductivity, and the change of the resistance in the transverse magnetic field having been investigated in a wide temperature range. The temperature dependence of the specific electrical conductivity σ and of the Hall constant R is shown in Fig. 1 for three compositions (Table) of the AlSb-InSb system. The authors investigated also the dependence of the Hall constant on the magnetic field strength H and the change of the resistance as dependent on H and the temperature. The curves 1-3 in the diagrams are related to the samples 9InSb.AlSb, 7.5InSb.2.5AlSb, and InSb.AlSb with the forbidden zone widths ΔE = 0.34, 0.43, and 0.82. The function $\Delta\varrho/\varrho_0 = f(H)$, which is not shown here, is quadratic at first, becomes linear with increasing H, and $\Delta\varrho/\varrho_0$ finally tends toward saturation

Card 1/2

Some Electric Properties of the AlSb-InSb System

S/181/60/002/05/07/041
B008/B058

in the presence of very strong transverse magnetic fields. The temperature dependence of $\Delta\varrho/\Delta\varrho_0$ is given in Fig. 2, the measurements having been carried out in a field of 5,000 oe. $\Delta\varrho/\varrho_0$ is very small (low mobility of the holes) at low temperatures, then it increases steeply and reaches a peak which shifts toward higher temperatures with a higher AlSb content of the samples. $\Delta\varrho/\varrho_0$ then decreases again. The ΔE values computed from R(T) agree well with those computed from $\sigma(T)$. The carrier concentration of the samples at the temperature of liquid nitrogen was found to be $5.6\cdot10^{16} - 5\cdot10^{17}$ cm^{-3}. Numerical data are given for the mobility of the carriers and their concentration. The authors thank B. V. Baranov and N. A. Goryunova for the synthesis and supply of the materials investigated. There are 2 figures, 1 table, and 5 references: 3 Soviet and 2 German.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN SSSR, Leningrad
(Institute of Physics and Technology AS USSR Leningrad)

SUBMITTED: September 23, 1959

Card 2/2

S/181/60/002/010/016/051
B019/B056

24.7700 (1043, 1143, 1559)
26.2420

AUTHORS: Yemel'yanenko, O. V., Nasledov, D. N., and Petrov, R. V.

TITLE: The Nernst-Ettingshausen Effect in p-Type Gallium Arsenide

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 10, pp. 2455-2457

TEXT: In an earlier paper (Ref. 1) the authors investigated the Nernst-Ettingshausen effect in n-type gallium arsenide. The coefficient $Q^{\perp}$ of the transverse Nernst-Ettingshausen effect in p-type gallium arsenide is graphically represented as a function of temperature. As it turned out, $Q^{\perp}$ is considerably lower for p-type gallium arsenide than for n-type gallium arsenide. This is due to a lower mobility of the holes as compared to the electrons. At temperatures below room temperature, $Q^{\perp}$ is negative, which may be explained by the scattering of carriers by impurity ions. This explanation agrees with measured results of the Hall-mobility of holes. Above 350 to 450°K, $Q^{\perp}$ becomes positive. This convinces the authors of the fact that at these temperatures the acoustic vibrations are the main scattering centers. The mixed conductance